ARCHIVES OF OPHTHALMOLOGY.

A CONGENITAL ANOMALY AT THE POSTERIOR POLE OF THE EYE.

By Dr. ALOIS BIRNBACHER, Graz.

(*With chromo-lithographic plate, xv., I.*)

Translated by Dr J. E. Weeks, New York.

A. Fischbacher, age twenty-one years, farm laborer from Ramsau, in Steiermark, is a large, well-developed man. Vision of parents, brothers, and sisters good. Patient's vision for distance is poor; he has, however, attended school, and has learned to read and write. My attention was drawn to the case when the patient reported for military duty.

An examination of the eyes disclosed the following conditions: Globes prominent, mobility good. No nystagmus, nothing abnormal externally. Vision, with -7 D $= \frac{5}{36}$ in both eyes. Jaeger, No. 1, at 8 *cm* with the right eye, same at 6 *cm* with the left eye. No scotomata; fields for white and colors normal. Light sense, as tested by Forster's photometer, normal (d = 2 *mm*). An examination with Placido's keratoscope demonstrates the absence of astigmatism or irregularities in the curvature of the cornea. The refracting media, as shown by the ophthalmoscope, are clear, the papillæ and retinal vessels of both eyes are normal.

At the macula lutea in the right eye there is a circular patch of probably $1\frac{1}{2}$ disc-diameters, which has the appearance of a hemispherical elevation; the patch is surrounded by a narrow border of black pigment, from which sharp processes project toward its centre. In the upper segment of the patch a stripe of pigment extends from above and inward to below and outward. In the portions of the patch where there is no pigment, the choroidal plexus of blood-vessels appears on a yellowish-gray, and in parts bluish, ground. This curious figure is separated from the sur-

rounding retina by a diffuse grayish-brown pigmented zone. The normal retinal vessels appear, passing close to the borders of the patch, but none are found on the patch itself.

A similar picture is seen in the left eye. The patch occupies, relatively, the same position as in the right eye ; the arrangement, however, of the pigment is very different. In the upper two-thirds a fine, honey-comb like network of pigment is visible ; below, the patch is divided into two trapezoid-like figures. Aside from this difference the patches in both eyes are alike.

The determination of the refraction with the ophthalmoscope gives the following astonishing results : Centre of patch, right eye, My = 8 D ; left eye, My = 7 D ; disc, and fundus in the immediate neighborhood of the patch, My = 25 D. The difference between the level of the fundus and the level of the apex of the elevated portion in both eyes is therefore about 5 *mm.*

By the subjective tests the apex of the elevation in each eye, which is myopic about 7 D, and occupies the point of most acute vision, corresponds to the fovea centralis.

Taking the sharply defined contour of the patches, and the fact that no other changes exist in the fundi, into consideration, we cannot doubt that this is a congenital condition. It is also evident that the elevated patches are covered with relatively normal retina, as proven by the absence of scotomata, normal light, and color-sense, and very good vision. The ophthalmoscopic appearances indicate the absence of all layers between the layer of rods and cones and the choroidal vessels, at the apices of the elevations. That the elevations are due either to a deposit between the choroid and sclerotic, or to an invagination of the sclerotic at the posterior poles of the globes, is evident. The clear-cut outlines of the patch renders the last-named condition scarcely probable.

As I do not know that in the development of the eye in man, or in the inferior animals, there is any stage that would favor the production of this condition, I can advance no explanation of the formative process in this case. I do not think that the "funiculus scleræ," described by Berlin, can be urged in explanation of the above, as, to my mind, the existence of the funiculus is not established. By a careful examination of sections from the eyes of infants and adults I have been unable to find the condition described by Berlin in a single instance.

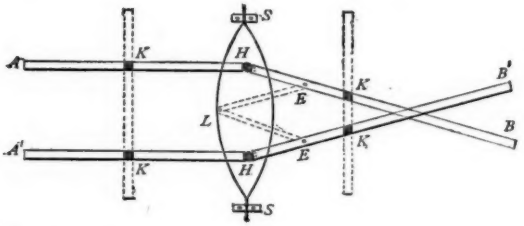
AN APPARATUS FOR THE DEMONSTRATION OF ACCOMMODATION AND REFRACTION.

By Dr. LUCIEN HOWE, Buffalo.

(*With a wood-cut.*)

ANY one who has attempted to illustrate by blackboard drawings the laws of accommodation and refraction, can realize how much time and annoyance could be saved by an instrument which would accomplish this with ease and rapidity. Some years ago an effort was made by the optician Cretes of Paris to produce an arrangement to obviate a certain amount of the difficulty, but it proved in practice quite inadequate to the purpose, and is but little known except to those who may have seen it in his establishment. It occurred to me, therefore, that his crude arrangement could be very much improved, and the parts which represent the rays of light be made to change their direction by a corresponding alteration in the form of the lens. This was shown in its still imperfect state at the last meeting of the American Ophthalmological Society, but as now complete, is ready for description. To make this as clear as possible, I would call attention first to the part representing the lens. This consists of two steel bands about 3 *mm* thick, 1 *cm* wide, and 25 *cm* long. They are joined at their extremities, and being bent concave toward each other, of course convex outwardly; the united ends above and below respectively are made to pass through a slot (*S*), the sides of which are attached to a piece of board about 125 *cm* long by 50 *cm* wide. These flexible bands then represent the lens, and are so elastic as

to be readily made more or less convex, tending always to resume their position of least curvature. The rays of light entering this lens are represented on the one side by two bands of brass (AH, $A'H'$), each about the same thickness and width as are the springs and about 60 *cm* long. At one extremity, however, they are fixed by a screw (H H') in the lens, to the board already mentioned, the other extremity (A A') being free. In order to be held securely in any position, each of these bands passes through a small slot (K), which in turn slides easily upon a fixed upright strip of brass. The horizontal bands represent, as has been said, the rays of light entering the lens. Those emerging from it are also represented by strips of brass of the same size as the former. They are fixed to the board at one extremity by the same screw (H) in the lens which



holds the first. The other end (B–B') is free, and each also passes through a slot (K) which moves upon an upright strip of brass. They differ, however, from the first, in that at a distance of about 12 *cm* from their point of attachment (H) in the lens they are each perforated by a screw (E). This serves to hold one end of a small bar of brass about 3 *mm* thick, 5 *mm* wide, and 850 *mm* long, which passes from this point to be attached to a point (L) on the under edge of the spring which forms the opposite side of the lens. By this arrangement, whenever the part which represents the lens is made more convex, the refracted rays approach each other; a complete illustration of the fact that the stronger the surface of curvature, the nearer to the lens does the focus fall. It adds to the elegance of the apparatus, and also removes any possibility of confusion of the

parts, if the four bands representing the rays of light and also the part representing the lens are nickel-plated or painted white, while all the other portions, including the board, are painted black. The necessary details of the description may convey an idea of some complexity of construction, but in reality this is simple in the extreme. Moreover, it serves the purpose for which it is intended, for the direction of the rays can be changed in an instant; and whenever the position of the lens is changed, a corresponding alteration at once takes place in the position of the rays which have entered it. The advantages of this arrangement are not based on theoretical considerations, but have been proved by considerable experience, and, for one who is not expert in blackboard drawing, the amount of time and labor saved is by no means small.

A CASE OF FOREIGN BODY DRIVEN THROUGH THE TISSUE OF THE NOSE INTO THE ORBIT—RECOVERY.

By LEWIS H. TAYLOR, M.D., Wilkes-Barre, Pa.

On February 7, 1885, Mrs. P., of a neighboring town, brought to my office her boy aged twenty months, stating that while playing three weeks previously he had fallen forcibly forward upon the floor, striking his head upon a penholder which he held at the time in his hand. The mother states that the penholder ran upward into the left nostril, and there broke off. A physician removed it, securing three pieces, but the mother thought another piece remained, and as the child's left eye had been in very bad condition since the accident and was rapidly growing worse, she feared it also had been injured, and on this account consulted me.

Upon examination the tissues around the left eye were found greatly swollen, hardened, and painful, the eye apparently bulging forward, the lids tightly closed and almost immovable, and pus escaping from between them. Any attempt at opening the eye seemed to cause great pain. Finally, by holding the head firmly between my knees, I succeeded, by aid of an elevator, in separating the lids to a slight extent, when, to my astonishment, there presented at the opening a black object, which I extracted and found to be the missing piece of penholder.

The piece was one and one sixteenth inches long, one eighth of an inch in diameter at its smaller and three sixteenths of an inch in diameter at its larger end. The penholder had been forced up the left nostril, a portion of it having passed through the tissues of the nose and into the orbit, where it had remained three weeks, causing intense pain and a high grade of inflammation. The child was unable to sleep, and seemed almost exhausted from its long siege of pain and worriment.

After removing the foreign body, I incised the swollen tissues freely, instilled atropia, and as the mother had been using a lotion of lead-water and laudanum, I continued this application. The cornea could not be seen at all at this visit, owing to the swelling of the surrounding tissue.

Feb. 9th.—The patient now seems bright and easy. Swelling has subsided considerably, and by forcing the lids apart the eye is seen beyond, apparently uninjured. Treatment continued.

Feb. 11th.—Swelling subsiding; cornea clear and normal. Has prolapse of lachrymal gland.

Feb. 19th.—He now begins to keep the eye open voluntarily. Chemosis is rapidly disappearing. Eye looks clear and bright. Pupil dilated from atropia. No iritis. The atropia was now discontinued, and a weak solution of zinc sulphate and boracic acid used. From this time onward the improvement was rapid, ending in entire recovery and leaving no defect in either eye or nose.

The case has seemed interesting to me, and possibly worthy of record, owing to the severe nature of the wound, the length of time the foreign body was carried in the conjunctival sac, and the final complete recovery without impairment of vision.

A SUGGESTION CONCERNING THE CORRECTION BY GLASSES OF CERTAIN ANOMALIES OF THE CURVATURE OF THE CORNEA.

By Dr. O. PURTSCHER, of Klagenfurt, Austria.

Translated, abridged, by Dr. A. Schapringer, of New York.

LAQUEUR [1] has recently published the valuable results of a series of ophthalmometric measurements carried out under normal as well as under pathological conditions. Among the latter were keratoconus, glaucoma, paralysis of ocular muscles, parenchymatous keratitis, coloboma of the iris and choroid, zonular cataract, iritis, etc., and also cases of extraction of cataract, iridectomy, strabotomy, and accidental injuries. He determined the different curvatures in the different meridians, or the co-called regular astigmatism, but did not pay any attention to differences of curvature in one and the same meridian. The latter subject has already been touched upon by Mauthner,[2] in the course of his elucidation of the subject of acquired regular *As*, especially of traumatic astigmatism (pp. 786, 787), and of that of irregular astigmatism (p. 801).

According to this author cylindrical glasses, as a rule, greatly enhance the acuteness of vision in eyes recently operated upon for cataract; later on they not only do not improve S, but lessen it, the patients seeing better with simple spherical glasses than with cylindrical combinations. This is explained by assuming that the cicatricial contraction

[1] Ueber die Hornhautkrümmung im normalen Zustande und unter pathologischen Verhältnissen. Ophthalmometrische Untersuchungen. *Von Graefe's Arch.*, Bd. xxx., 1, pp. 99–134.

[2] Vorlesungen über die optischen Fehler des Auges. Wien, 1876.

neutralizes the regular as well as the irregular astigmatism caused by the operation.

As to the variety and degree of *As* caused by the operation of extraction of cataract, Laqueur states that as a rule the vertical meridian is flattened. He found its curvature increased in a few cases only. The difference of curvature in the two principal meridians was at least 1.5–2 D during the first two weeks, usually it was 3–4, and occasionally 6–7 D. In one exceptional case of irregular cicatrization it was 16 D. In the course of the following weeks he found the traumatic *As* decreasing, and at the end of the third or fourth month the condition of the refraction became stationary, but the *As* never disappeared entirely.

My own practical observations concerning traumatic *As*, its variety and corrigibility by convex cylinders with horizontal axis, and also its subsequent decrease, coincide with those made by Laqueur in every respect. There is, however, one point to which too little attention has been paid up to this time, and to which I wish to draw the attention of my colleagues.

Although I have not made any ophthalmometric measurements myself, I think I am justified in assuming that in cases as those spoken of before, the radius of curvature differs in different parts of one and the same meridian. In cases of extraction of cataract for instance, if the incision be performed above, the lower or corneal border of the wound will protrude somewhat over the upper or scleral border, and consequently the uppermost portions of the vertical meridian will become flattened considerably, while the flattening will become less perceptible in the lower portions, which are further removed from the line of incision.

It is an indubitable fact that in many cases of irregular cicatrization after operative or accidental traumatism of the cornea, the glasses now in use do not accomplish all that is desired, and that there is considerable room for their improvement. This improvement could be effected if lenses were produced analogous to the cylindrical lenses such as are employed at the present time, but with the radius of curvature varying in different parts of one and the same

meridian, so as to correspond to the peculiar optical defect of the cornea spoken of. On a longitudinal section a lens such as here proposed would present an elongated rectangle, the same as a common cylindrical glass. A transverse section, however, would differ from that of a cylindrical lens as shown in these diagrams:

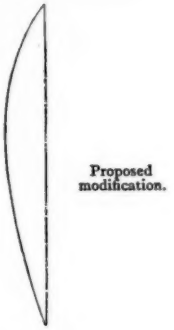


FIG. 1.

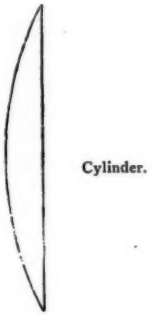


FIG. 2.

I do not know whether such a modification has already been proposed by somebody else or not. If it has been, the suggestion has been allowed to drop into oblivion.

Upon inquiries made of Mr. F. Fritsch, the well-known optician of Vienna, I was informed that the production of such lenses was feasible, but that the construction of the necessary plant would involve an inordinate outlay of money on account of the undeveloped character of the technical appliances at our command at the present time.

For this reason I have been debarred from making any practical experiments myself, but I don't doubt that further investigation of this subject by ophthalmic surgeons, combined with improvements made in the technical appliances, will lead to good results in the direction suggested by this article.

ON THE PROBABLE CAUSE OF THE COLORED RINGS SEEN IN GLAUCOMA.

By Prof. W. DOBROWOLSKY, of St. Petersburg, Russia.

Translated by Dr. A. Schapringer, of New York.

SINCE the investigations of Donders on this subject have been published,[1] the appearance of colored rings surrounding flames in glaucoma has been generally attributed to a cloudy condition of the transparent media of the eye. Mauthner[2] has been the only one to enunciate the opinion that the appearance of these rings may be a phenomenon of nervous irritation only. He based his opinion upon the analysis of a single case only, and did not enter into a discussion of the nature of this irritation.

Observations which I have made enable me to record certain conditions under which colored rings will make their appearance, while the refracting media remain entirely clear.

Young persons suffering from progressive myopia often complained to me about such colored rings. In several of these cases myopia was complicated with spasm of accommodation, but without any diminution of S. In all of them the background of the eye showed symptoms of irritation. The optic disc was red, its outlines ill defined, and the choroid showed the recent changes peculiar to progressive myopia. There were usually photophobia, lachrymation, photopsia, and spells of asthenopia. It is a noteworthy fact that atropia and blood-letting always made the colored rings dis-

[1] *Arch. f. Ophth.*, Bd., viii., 2, p. 166 *et seq.*

[2] "Die Lehre vom Glaucom," 1882, p. 48 and 49.

appear for a more or less considerable period of time, together with the other symptoms complained of. In Mauthner's case the patient saw rainbow-colored rings, at first with the right eye alone, in which an apparent myopia of $\frac{1}{60}$, found upon examination, disappeared again in the course of a few days. I wish to lay stress upon this apparent myopia, because in all the cases of spasm of accommodation observed by me, I always found hyperæmia in the fundus. I regret that in the case of Mauthner no note has been made of the ophthalmoscopic appearances, and that the refraction has not been determined under atropia.

I will here add some observations made upon my own eyes.

Several years ago I began to notice colored rings around a light while in a Russian bath. At first I thought that the appearance of these rings was caused by the hazy condition of the air due to the presence of steam. By closer analysis, however, I found that the cause was to be sought elsewhere. On entering the bath room, saturated though it was with steam, I did not see the rings immediately, but only after the lapse of about half an hour, during which time I washed my head with pretty hot water, which reddened the skin of my skull and face and the conjunctiva of the lids as well as that of the eye-balls, and caused a sensation of heaviness in my head. It was only then that I began to see rainbow-colored rings around the gaslight, which became even more distinct if I left the hot chamber for a cooler one in which there was considerably less steam. The rings showed all the colors of the spectrum, from red which formed the outer border, to blue which formed the inner border. I could not distinguish indigo and violet, which was evidently owing to the slight intensity of these colors. In consequence of the absence of the last-named two colors, there was a dark space between the innermost or blue ring and the flame.

The colored rings gradually faded away, keeping step with the subsidence of the hyperæmia of the head and face after leaving the Russian bath. After they had disappeared entirely, I could recall them by pressing upon the globe

long enough to make all objects disappear from view for a few moments. On releasing the pressure, and after the objects had been in view again for a few seconds, the colored rings returned and were quite distinct.

For the last few months I have constantly seen these rings around the lamp-light in the evening. They are much more distinct with the right eye than with the left. There is no noticeable increase of tension, and the visual acuteness is $\frac{25}{20}$, above normal, the same as it always has been during the last twenty years. Tension of accommodation, either by fixing the rainbow circles or by using concave glasses, always renders them more distinct, the same as pressure upon the eyeball.

It follows from these observations and experiments that rainbow rings may be seen by eyes which are free from cloudiness of the refracting media. In the cases of progressive myopia, the absence of opacities discernible with the ophthalmoscope and the perfect visual acuteness tend to disprove the assumption of slight cloudiness of the vitreous, which could be made on the base of analogy. As to my own eyes, their supranormal acuteness of vision persisting during the appearance of the colored rings excludes every idea of haziness of the media. Neither can the results of my experiments by pressure exerted upon the globe and by tension of the accommodation be satisfactorily explained by any sudden change in the refracting media.

The only way to explain this phenomenon is to assume that it depends upon the irritation of the retina and the optic nerve by hyperæmia.

ON THE ORIGIN OF STRABISMUS.

By Professor J. STILLING, of Strasburg, Germany.

Translated (abridged) by Dr. A. Schapringer, of New York.

IT is generally assumed that in the position of rest the visual axes of both eyes are parallel. This is true, however, only in a limited number of cases. The fact is that with the majority of mankind the position of rest is a squinting position. In my own case it is convergent, as I have found out by relaxing my ocular muscles whilst gazing at a solitary bright star, which then appears in homonymous double images. I obtain the same results by relaxing the ocular muscles whilst looking at nearer objects. The well-known equilibrium test with vertical prisms confirmed this result.

Furthermore, after closing one eye gently while looking at a star or at a candle flame at the distance of six metres, I see homonymous double images at the instant of re-opening, the images standing farther apart than in the prism test. There are two ways of explaining this phenomenon: either the eyeball was forced mechanically into the convergent position by the effort of closing the lid, or it went into that position as being the one of natural equilibrium. A series of tests made with a number of medical men, in which crossed diplopia was the result obtained, prove the latter explanation to be the correct one. In their cases divergence was the position of rest. The reliability of the tests is made evident by the fact that Messrs. Goltz, Witkowski, and Ewald were among those who made these experiments for me.

The test just spoken of seems to prove that in quiet dreamless sleep the eyeballs as a rule occupy the position of equilibrium peculiar to the individual, which may be either convergence, divergence, or parallelism, whereas the observations of Raehlmann and Witkowski have shown that during sleep the coördination of both eyes is suspended, there being neither associated nor convergent movements as in binocular vision.

I have examined many persons according to the above methods, and have found that in the position of rest most eyes are convergent, many divergent, a few only are parallel.

Since eyes squint when at rest, the question naturally arises whether strabismus is not the maintenance of the position of rest (or of a position approaching it), with renunciation of binocular vision?

According to the well-known theory of Donders, the convergent squint of hypermetropic eyes is based upon the law, discovered by him, of the relative range of accommodation, which formulates the interdependence of accommodation and convergence. But this law is valid only as long as relative accommodation is possible, *i. e.*, as long as there is binocular fixation, which is a *conditio sine qua non* of relative accommodation. Binocular fixation being abolished in strabismus, the law of relative accommodation which applies only to binocular vision forthwith loses its force.

I have made comparative tests on the basis of the experiments mentioned before in numerous series of cases, comprising all the different states of refraction, including astigmatism and anisometropia. The results have been as follows:

In each form of refraction every variety of the position of rest may occur. In a great majority of cases of hypermetropia the position of rest is convergence, whilst in myopia it is divergence. In emmetropia the rule is convergence. I will quote some figures to prove this. Among the 57 pupils of the Teachers' Seminary of this city I found 10 myopes. Of the latter number convergence proved to be the position of rest in two cases only, in all the rest it was

divergence. Of the number of 16 hyperopes among them, not a single one showed divergence as the position of rest, it being found to be convergence in all of them. Of the 27 emmetropes two showed divergence, two parallelism, all the others convergence. Of the three pupils having myopic astigmatism, two showed convergence and one divergence. Among 40 medical students I found 16 myopes, in 9 of whom divergence proved to be the position of rest. Among 22 myopes examined in the dispensary it was divergence in 14 cases. These figures will suffice without my going into further particulars. During the last few months I have examined 65 myopes and 86 emmetropes in Strasburg alone. Among the former divergence was the position of rest in 41 cases; among the latter it was convergence in 68 cases.

These facts prove not only that in the majority of people the position of rest for the eyes is convergence, but also the variety of the form of rest of non-squinting hypermetropic and myopic eyes corresponds to the variety of squint predominant in these two classes of abnormal refraction. The predominance of convergence in hypermetropia is greater than that of divergence in myopia. The position of rest has therefore to be considered as an important factor in the production of squint.

I next considered the relations of the position of rest to adduction and abduction.

I made the necessary tests according to the principles laid down by Von Graefe, but soon found that it was sufficient for the purposes of this investigation to compare distal abduction with distal adduction. This is done by placing a lighted candle at a distance of six metres in front of and on a level with the eyes of the person examined, and making him look through prisms with the basis inward and then outward. The values received in this manner for distal abduction do not differ materially from those obtained by first approximating the candle whilst lowering the visual plane, and only gradually removing it.

Distal abduction in normal eyes amounts to 4° to 6°, as can be easily verified; distal adduction fluctuates between 14° and 24°. Adduction of more than 20° is rare, the rule

being 14 to 16°. Abduction of more than 6° and adduction of less than 12° are to be considered as abnormal.

The relations of the values of abduction and adduction to the position of rest of ametropic eyes are by no means constant. Thus, for instance, there may be increased abduction with very good adduction, the position of rest being divergence.

Example:

J. S. Myopia 1 D and 3 D.

Position of rest: divergence. No dynamic divergence anywhere with the ordinary tests.

Abd. = 12°.

Add. = 22°.

One may be inclined to explain the position of rest in this case by an elastic preponderance of the external recti muscles, while adduction at the same time is very good. But there are cases in which abduction is not excessive, and adduction abnormally great, whilst the position of rest is, nevertheless, divergence.

B. W. Hypermetropia.

Abd. = 6°.

Add. = 25°.

Position of rest: divergence.

If the position of rest depended upon muscular preponderance only, that position in this case would have been convergence instead of divergence. In a certain number of hypermetropes convergence is the position of rest, although abduction is increased and adduction abnormally weak.

M. L. Hypermetropia 4 to 5 D.

Distal abduction = 10°.

Proximal abduction (von Graefe) = 20°.

Position of rest: convergence.

It can be easily proved that in certain cases, be it of hypermetropia or myopia, there may be insufficiency of the interni muscles, or even relative actual divergent squint, whilst the position of rest is nevertheless convergence. This position is, as a general rule, therefore, not dependent upon the muscular conditions, though such may be the

case in some individual instances. In the following case it was evidently influenced by absolute weakness of the interni muscles:

K., M.D. Hyperopia 8 D.
Abd. = 10°.
Add. = 2°; proximal add. = 8°.
Position of rest: divergence.

There was relative actual divergent squint without a correcting glass—with the latter there was fixation for a short while only.

In a considerable series of cases the muscular conditions were exactly the same, and the position of rest were nevertheless different.

(1.) W., student of med.	(2.) Dr. O.
Hyp. = 2 D.	Myopia = 3 D.
Abd. = 6°.	Abd. = 6°.
Add. = 8°.	Add. = 8°.
Relative actual diverg. squint.	Relative actual diverg. squint.
Position of rest: convergence.	Position of rest: divergence.

From these two cases the inference could be drawn that the position of rest does not depend upon the condition of the ocular muscles, but upon that of the refraction. But the following two examples show that the refraction as well as the muscular conditions may be identical, and still the position of rest may be different:

(1.) F. L.	(2.) M. M.
Hyperopia = 2 D.	Hyperopia = 2–3 D.
Abd. = 6°.	Abd. = 6°.
Add. = 12°.	Add. = 12°.
Position of rest: convergence.	Position of rest: divergence.

In high degrees of myopia the position of rest has been found to be indiscriminately either convergence, even in cases of insufficiency of the interni, and in relative divergent squint, or divergence, the latter position having been found combined with abnormally increased adduction. An instance of the last-named combination is the case of Dr. Hoffmann, who has made a special study of the relations

between the muscular conditions and the state of refraction, and who has a myopia of 9 D and the abnormally great adduction of 90°, in whom divergence is the position of rest. In high degrees of hyperopia it is either divergence or convergence.

Among the factors to be taken into consideration as influential in determining the position of rest (besides refraction and the muscular condition), and which have not been made the object of study as yet, are the shape of the orbital cavity, the topographical relations of the fibrous structures and other soft parts surrounding the globe, the position of the entrance of the optic nerve, and perhaps also the angle α. In emmetropia as well as in hyperopia these factors probably favor convergence as a position of rest, whilst in myopia the opposite is likely to prove to be the case.

Schweigger explains convergence and divergence as positions of rest in the same way as actual squint, namely by the elastic preponderance of certain ocular muscles, but as has been shown above, there are other factors besides this preponderance which have to be taken into consideration.

It is easily seen from the example detailed above, that insufficiency of the internal recti is apt to be diagnosticated in cases where there is none. This is often done in myopia, as has been admirably shown by Schweigger.[1] The true explanation of the apparent insufficiency is, that the eye, when excluded from binocular fixation by the covering hand, passes into its position of rest. Tests performed with the aid of prisms will furnish proof in such cases that the deviation of the eyeball is not due to a pathological condition of the muscular apparatus, but that it is a physiological phenomenon.

With the aid of these newly discovered facts it will not be difficult to differentiate between apparent or physiological squint and real pathological strabismus.

Normal vision is a continued struggle of the ocular muscles for binocular fixation against natural obstacles. If for one reason or another one eye becomes unable to keep up

[1] Klinische Untersuchungen über das Schielen, pp. 64 and 65.

this struggle, or if it becomes impossible for both eyes to continue it in unison, then either one eyeball or both alternately will pass into the natural position of rest. Abolition of binocular vision may be due to many causes, and may originate either in the muscles or in the eyeball itself, or in both. In the majority of cases they originate in the eyeball and are well known to us. I allude to differences of refraction and to the different varieties of amblyopia. To these we must add all general and local causes tending to weaken accommodation or to suspend it altogether.

In hypermetropia the position of rest is convergence. Now, if by reason of congenital amblyopia, an excessive difference of refraction or of some other cause, one eye is incapable of participating in binocular fixation, the laws of relative accommodation will become inoperative and the eyeball, instead of assuming a convergent position corresponding to the object fixed, will pass into its individual position of rest. If this position is a marked convergence, convergent strabismus will ensue. If it be slight convergence only, the consequence will be relative divergent strabismus, either permanently or only temporarily, changing later on into absolute convergent squint, by reason of secondary atrophy of the relaxed external rectus and contracture of the internal muscle.

In such cases the matter is clear and simple. But how is it in cases where both eyes are evenly and only moderately hypermetropic, and where both are possessed of normal visual acuteness? It is well known that in monocular vision we can dispose of the whole range of accommodation, whilst in binocular vision we are subject to the laws of relative accommodation. In hypermetropes the positive part of the relative range of accommodation is apt to become too small as compared with the negative part, rendering it impracticable to keep up the effort of accommodation pertaining to a certain position of convergence for any length of time, or even to attempt it at all. But as we have seen above, the faculty of convergence, whether sustained by the external or the internal rectus muscle, is difficult to maintain whenever the power of accommodation makes

default, and therefore one of the eyes, or both alternately, pass into the position of repose. By sacrificing binocular vision, the hypermetrope emancipates himself from the laws of relative accommodation, the positive part of which has become too small, his absolute accommodation becomes free for monocular vision, and asthenopia disappears partly or entirely.

The position of rest for hypermetropes being strong convergence, active contraction of the external recti muscles will be necessary, even for shorter distances, in order to sustain binocular fixation. Under such circumstances squint may be produced by mere fatigue of the external muscles. This is more apt to occur when these muscles happen to be weak than when they are strong. In hypermetropes with strong convergence as position of rest, the external recti will naturally become strong by practice, and the increased power of abduction, combined with undiminished power of adduction, as met with by Ulrich[1] in many cases of this error of refraction, is hereby explained, and not by the assumption of relative insufficiency of the external recti muscles.

The cause of squint is not hypermetropia but the position of rest usually associated with hypermetropia, viz., convergence. On the main the results of my investigations coincide with the view enunciated by Schweigger.

According to what has been demonstrated above, divergent strabismus may occur where the position of rest is divergence, even without any insufficiency of the interni. Should they happen to be insufficient, this will of course form a favorable factor, and if they be absolutely weak, this circumstance alone would suffice to explain the development of divergent strabismus in myopia, the explanation being analogous to that of convergent squint, developing in cases of hyperopia and absolute weakness of the external recti muscles. It is in such cases the consequence of muscular fatigue only, and has nothing to do with the error of refraction either directly or indirectly.

There are rare instances of myopia combined with insufficiency of the external recti *and a convergent position of rest*,

[1] Die Aetiologie des Strabismus convergens hypermetropicus, p. 22.

and if squint develops in those cases, it will be of the convergent variety. *The prevalence of the divergent form of strabismus in myopia is not due to the anomaly of refraction as such, but to the prevalence of divergence as a position of rest in myopic eyes.*

That form of squint called parallel strabismus, to which Schweigger has called attention anew, easily fits into our theory. It concerns such rare cases in which the position of rest is parallelism or approaching it.

Ulrich, a recent author on our subject, has set out in search of "obstacles to the development of strabismus." The progress of our investigations has made these obstacles clear.

Let us first ask the question, Why do not all hypermetropes develop convergent squint?

The answer is the following:

1. In a number of cases of hyperopia the position of rest is divergence. If in such instances the internal recti become more or less insufficient, the consequent strabismus will be divergent.

2. With some hypermetropes the position of rest is slight convergence only. If strabismus develop in any of these, it could be only of the relative divergent variety, even if the interni should not be insufficient.

3. The position of rest may be divergence, without any insufficiency of the interni.

4. In a few isolated cases the position of rest is parallelism.

5. Some individuals are not capable of relaxing the external muscle of one side only, though their position of rest may be strong convergence and in spite of the presence of asthenopia.

6. And lastly, the majority of hypermetropes do not squint on account of the strong inherent desire for binocular fixation, and because the power of accommodation in youthful individuals is ample to overcome the disadvantages of hyperopia, as has been well elucidated by Schweigger.[1] They remain victorious in the struggle between bi-

[1] *L. c.*, p. 22.

nocular fixation and the position of rest, just the same as emmetropes, though it costs the former more of an effort. In other words, the majority of hypermetropes have no inducement to squint, just as little as emmetropes have. As regards higher degrees of hyperopia, the statistics of Schweigger[1] show that they are rare in the same proportion as cases of strabismus with the corresponding degree of hyperopia. On the whole, the same considerations hold good here as with hyperopic convergent strabismus in general. And finally, as Donders properly remarks, highly hypermetropic persons do not gain any thing by squinting. They could emancipate themselves from the laws of relative accommodation, but the power of accommodation of the fixing eye would still be insufficient.

Ulrich counts also the antagonism of the visual fields (Wettstreit der Sehfelder) among the abstacles to squint, which I mention here for the sake of completeness. The significance of insufficiency of the internal recti muscles, upon which this author lays so much stress, has, I believe, been correctly appreciated above.

A question, analogous to the one about the immunity of the majority of hypermetropes from convergent squint, can be raised about myopes. Why do they not all squint outward? The answer is the following:

1. Some myopes squint inward because their position of rest is convergence, and there may be insufficiency of the external recti besides.

2. The position of rest of many myopes is convergence. If this be only slight, only relative divergent squint can possibly develop. The same holds good for parallelism as position of rest.

3. Even if all circumstances are favorable for outward squint, it will not develop if the individual cannot learn to relax one internal rectus muscle in order to give the eyeball a chance to assume its position of rest.

4. Finally, the majority of myopes do not squint because they have acquired the faculty of shifting the range of relative accommodation in the interest of binocular fixation, so

[1] *L. c.*, p. 21.

that the synergistic efforts of accommodation are reduced to a minimum.

The main obstacle to squint for ametropic eyes therefore is the same as for emmetropes, namely, preponderance of binocular fixation.

The subject of obstacles to squint comes up also in paralytic strabismus. Especially in paralysis of the abducens nerve the question may with propriety be raised: Why does not convergent paralytic squint develop in every case of paralysis of that nerve?

The answer now is simple: the development of inward squint depends in each case upon the position of rest. If it is divergence or parallelism, inward strabismus cannot develop. If the position of rest is convergence, the degree of squint and the rapidity of its development will depend upon the amount of this convergence and upon the strength of the internal recti muscles. Should the cause of the paralysis be removed, the disappearance of the consequent paralytic squint will depend upon the issue of the struggle between binocular fixation and the position of rest.

The spontaneous cure of squint also depends upon the same issue, as has been pointed out anew by Schweigger. Since such spontaneous cures occur as a rule during the period of growth, they are obviously the result of a change in the position of rest brought about by changes in the size of the globe and its adnexa.

A CONTRIBUTION TO THE STUDY OF SYMPATHETIC OPHTHALMIA.

By H. GIFFORD, M.D., Omaha, Neb.

(*With colored plates* xvii., *A, and B.*)

IMMEDIATELY after the appearance of Deutschmann's most important paper on this subject (*Archiv für Ophthalmologie*, xxx.), I began at Erlangen a series of experiments for the purpose of verifying his results. Deutschmann, as is well known, by injecting into the vitreous of rabbits the ordinary yellow and white pus-cocci, was able, almost without exception, to obtain well-marked sympathetic neuro-retinitis of the fellow eye. The time required for its development varied from a few days to three weeks. No typical sympathetic iritis was produced, as the animals all died of a general infection soon after the appearance of the neuritis. With the microscope the micrococci could be traced from one eye to the other by way of the optic nerves, their sheaths, and the chiasma. These experiments gave such constant results that I believed it would only be necessary to repeat them and publish a short confirmatory notice of the work. Contrary to my expectations, however, I failed altogether to obtain an unquestionable inflammation in the fellow-eye in twenty-one cases in which I inoculated the vitreous of rabbits with pure cultures of pathogenic cocci. (Staphylococcus pyogenes aureus was used in nine cases, staph. pyog. albus in eight cases, and streptococcus pyog. alb. in four cases.) In fifteen cases the animal was allowed to live from three weeks to two months; three rabbits were killed within two weeks, and three others died from a general infection within three to nine days after the

first inoculation. The inoculated eye invariably underwent a severe inflammation, which generally became chronic and ended in more or less pronounced phthisis; three cases, however, resulted in panophthalmitis. The microscopic examination showed, according to the stage, the vitreous chamber filled with a purulent or semi-caseous exudation, which in some cases extended more or less into the posterior chamber; the layers of the choroid pressed apart by a dense infiltration of round cells; the deep physiological excavation plugged with the same; and the retina more or less thoroughly disorganized. The lymph-spaces around the central vessels of the optic nerve, the orbital tissue below the nerve, and both sheaths and the lymph-spaces around the small vessels of the nerve itself, for a distance of 3–4 *mm* back of the eyeball, were all markedly infiltrated with round cells. In some cases there was a slight amount of inflammatory exudation in the subvaginal space. The orbital tissue and the pial sheath were especially strongly affected in the neighborhood of the exit of the central vessels from the nerve into the orbit. In the chiasma and second eye with its nerve, I have in no case found a certainly pathological condition, though, for reasons given further on, these were not examined in all cases. The ophthalmoscopic appearance of the second eye remained normal except in two cases, in which, on the third day, there was a slight but undoubted hyperæmia of the disc; this lasted for a few days and then passed away, leaving no microscopic abnormity.

The foregoing differs from the results obtained by Deutschmann in that his description of the histological conditions mentions a general inflammation of both optic nerves and their sheaths, most strongly marked toward the globes, without specifying any definite relation to the lymph-channels, and without mentioning any affection of the orbital tissue. In my cases the infiltration of the nerve-trunk was confined to the lymphatics along the vessels, and could not be traced farther back of the eyeball than 3–5 *mm;* that of the sheaths not quite so far. On the other hand, the orbital tissue showed a certain amount of inflammation almost to the posterior end of the cone of muscles.

The difference between Deutschmann's observations and my own regarding the distribution of the micrococci is no less marked. He describes them as occurring all through the first eye and in both optic nerves and their sheaths, without mentioning any special relation to blood- or lymph-vessels. In my cases they were generally limited to the vitreous of the inoculated eye, occurring in greatest numbers in the exudation just before the papilla and just behind the zonula. In no case could they be found farther back than the bottom of the physiological excavation. In the infiltration filling the central canal, along the small vessels of the nerve, in the sheaths, subvaginal space, and orbital tissue, I have searched for them long and in vain. The granules of nuclei, particularly of the round cells, retain the staining substance in almost the same intensity, and often even more tenaciously than the cocci themselves, and often present figures which are most strikingly like them, but a perfectly clear-cut, unquestionable group of micrococci I have found in no case nearer the cranial cavity than the bottom of the optic excavation. On account of this negative result, and since the second eye remained almost invariably normal ophthalmoscopically, the latter was examined in very few cases, here also with negative results.

As has been shown in another paper, particles of india-ink or cinnabar are readily carried out from the vitreous to the orbit by the stream which passes along outside the central vessels of the retina. Why the micrococci are not in like manner swept out depends, in all probability, on the choking of the lymph-vessels with leucocytes, which was so marked a feature in all the cases. This obstruction, however, is not complete, as is shown by the fact that the irritating excreta of the cocci find their way out in sufficient quantity to excite a certain reaction for some distance back of the eyeball.

Why Deutschmann should have obtained such different results cannot at once be explained. The first thought was that a different variety of fungus had been used, but experiments with cultures which he was kind enough to send me gave no more positive results. The fact that his rabbits,

almost without exception, died of a general infection, indicates that they were decidedly more sensitive than those used in my experiments. The preparations which he has shown me certainly demonstrate a decided inflammation in the pia of the chiasma and of the sheaths and posterior part of the choroid in the second eye. All of which, of course, might have resulted from the carrying over of soluble irritating matter without the micrococci having passed farther back than I have found them. His preparations of cocci had lost their color at the time of my visit to Göttingen.

Convinced by these experiments that with the rabbits obtainable at Erlangen and Zürich, it was practically impossible to produce sympathetic ophthalmia with a fungus that excited a quick and strong reaction, I was equally convinced by experiments with amorphous powders that a micro-organism capable of living in the lymph without exciting too intense an inflammation, must of necessity be carried around from one eye to the other. Such an organism I found in the bacillus of anthrax or splenic-fever, the use of which was first suggested to me by Prof. Klebs, of Zürich. This bacillus I have indeed succeeded in tracing from the vitreous of one eye around into the perichoroidal space of the other, although the course has been completed in but three out of twenty-five cases, owing to the rapidity with which the animals die when the subconjunctival tissue is inoculated, and in making injections into the vitreous it is exceedingly difficult to avoid such inoculation. Where this happens, as was the case in the great majority of the experiments, the following occurs: If the bacilli or their spores have been brought into the posterior part of the vitreous, one observes within twelve to twenty-four hours a considerable exudation filling up the optic excavation or concealing the papilla entirely; there is also some conjunctival œdema, in the neighborhood of the inoculation-wound. In the next forty-eight hours this exudation extends more or less into the vitreous, and begins to collect on the floor of the chamber. The iris generally remains quite normal, but the conjunctival œdema increases to an enormous extent, the swollen membrane almost concealing

the cornea; death generally occurs within sixty to seventy hours after the inoculation. The microscopic examination shows all the vessels throughout the body more or less filled with bacilli; the subconjunctival and orbital tissue œdematous, with numerous leucocytes and masses of bacilli. An exudation composed of fibrin, leucocytes and bacilli fills the optic excavation and extends into the vitreous. A similar exudation also frequently occurs at the bottom of the vitreous chamber, and at the periphery of the lens behind the zonula. Groups of bacilli almost constantly occur between the choroid and partially detached retina. These undoubtedly gain entrance at the wound, for I have seen no signs of their growing directly through the retina. *The lymph spaces of the central canal of the optic nerve are filled with bacilli, which can generally be followed with the vessels for a short distance into the orbit.* Along the branches from the central vessels they can also be traced toward the choroid and the periphery of the nerve, and for a short distance directly backward; this last especially at the point where the main vessels pass through the pia toward the orbit. In the sheaths of the nerve, except at the point of the pia just mentioned, in the space between them, in the cranial cavity, and in the second eye with its nerve and sheaths, there are no bacilli except those within the vessels.[1]

The following are the cases in which the bacilli reached the second eye:

Case 1.—*Aug.* 4, 1885.—Large gray rabbit. O. D. A very small drop of water containing a particle from the surface of an old anthrax culture injected into the vitreous near the papilla, about 3 *mm* above and to the outer side.

Aug. 5th.—O. D. Optic excavation filled with exudation. The latter also stretches out in the direction of the scleral wound. O. S. normal.

Aug. 6th.—O. D. Exudation in the vitreous increased; begins to collect on the floor. O. S. normal.

[1] It should be noticed that although the stream in those lymph-channels of the nerve that run longitudinally is toward the brain, at least for a short distance back of the eye, these channels are of secondary importance compared with those leading into the orbit. In no case did the former contain bacilli farther than a few millimetres back of the eye.

After this the exudation rather diminished than increased; the anterior segment of the eye remained apparently normal, as did the left eye, and the animal showed no general symptoms till Aug. 24th. It then appeared depressed, and died on the 26th. The usual conjunctival œdema altogether failed to appear.

The microscopic examination showed bacilli sparingly present in all the blood-vessels. In the inoculated eye the appearances differed from those just described in the following points: The bacilli in the vitreous nearly all showed signs of disintegration, *i. e.*, they could only be stained with difficulty or not at all, and were more or less irregular in contour. In the central optic canal they were also stained irregularly; along the smaller vessels, on the contrary, they were unusually numerous and well stained. The important points, however, were that the bacilli extended along the vessels to the posterior part of the orbit. They were also present in the cranial cavity on the surface of the pia covering the cranial portions of *both* optici and the chiasma; also in the intervaginal space of *both* nerves increasing in quantity toward the eyeballs to the point where the space begins to narrow, whence the line of bacilli tapered rapidly out and disappeared in the right eye shortly back of the perichoroidal space; in the second eye it could be clearly traced for a short distance into this space. The inner layers of the dural sheath were densely infiltrated with bacilli, particularly near the globes. They were also free on the surface of the pial and of the arachnoideal sheath, where the latter was preserved in the sections. In the subvaginal space there were clearly more bacilli in the second eye than in the first, though the difference was not great.

Case 2.—*Sept.* 16, 1885.—Large gray rabbit. O. D. Posterior part of the vitreous inoculated with a small clump of anthrax spores.

Sept. 17th.—Exudation concealing the papilla.

Sept. 18th.—Exudation in the vitreous considerably increased, and collecting on the floor of the chamber. O. S. normal.

Sept. 19th, 2.30 P.M.—O. D. Conjunctiva very slightly œdematous. Animal markedly depressed; involuntary muscular contractions. Chloroformed, unfortunately without previous ophthal-

moscopic examination. Macroscopic examination : Pia mater markedly congested ; below and in front of the chiasma, slight purulo-fibrinous exudation. The tissues around the nerve-entrance of the right eye somewhat œdematous ; also to a less extent in the left eye. Microscopic ex. (Plate 4). O. D. Bacilli and exudation in the vitreous and along the central vessels, only more numerous and with more marked inflammatory reaction than usual. A large mass of bacilli and leucocytes in the supravaginal space just posterior to the point where the central vessels leave the nerve. In this space the fungi had passed back only about two thirds of the way to the optic foramen ; but along the vessels and in the loose connective tissue they were present to the posterior end of the orbit. In the cranial cavity in front of the chiasma and between and below the optic nerves, considerable quantities of bacilli with some inflammatory exudation. Between the sheaths and in the inner layers of the dural sheath of *both* optici, they occurred about as in the preceding case, except that (1) they were present in much greater quantity, and were accompanied by a few leucocytes ; (2) there was about the same quantity in each eye ; (3) in the second eye they were beginning to be drawn into the stream which passes along the central vessels into the orbit (see vol. xv., p. 158). Along the central retinal vein there were such masses of bacilli that in making the sections they were in some places displaced by the knife so as to appear to lie within the walls ; but with this exception, in no part of either eye, nerve, orbit, or chiasma were fungi to be found *in the vessels*. This makes it highly probable that no general infection had taken place when the animal was killed, though as no injection of the blood was made into another animal, it cannot be considered certain.

Case 3.—*Jan.* 2, 1886.—Large white rabbit. Anthrax spores dried on the end of a fine glass rod, and the latter introduced and broken off in the vitreous of O. D., close behind the lens, below and to the inner side.

Jan. 3d.—Signs of growth around the bit of glass.

Jan. 4th.—The whole anterior part of the vitreous cloudy ; slight, sharply circumscribed œdema of the conjunctiva close to the cornea, at a point corresponding to the position of the glass in the vitreous. Iris perhaps a trifle hyperæmic in this region. O. S. normal.

Jan. 5th.—Immense œdema of the whole conjunctiva.

Jan. 6th.—Found dead.

This case occurred just as I was obliged to interrupt the experiments, and I have been unable to examine the eyes thoroughly. Macroscopically there was a marked hemorrhagic meningitis of the under surface of the anterior half of the brain. The few sections which have been prepared and examined show that the bacilli had reached the cranium and had been carried thence down to both eyes in about the same number as in Case 1. The passage of the fungi from the vitreous into the central optic canal of the first eye was apparently just beginning; on the other hand, they had passed out of the anterior segment into the subconjunctival tissue—just *how*, cannot be positively stated, but probably around the lens, through the insertion of the iris, and along the branches connecting the ciliary and episcleral vessels; thence *via* Tenon's space and the retrobulbar orbital tissue to the cranium. The interior of all the blood-vessels throughout the sections was perfectly free from bacilli. The animal probably died simply from the meningitis.

It will be observed that no ophthalmoscopic abnormity was seen in the fellow-eye in any case; microscopically also the papillæ were perfectly normal.

In two cases where the animals died of the general infection before the bacilli had reached the cranial cavity, there was, besides the usual growth into the orbit along the central vessels, an unusually strong development along the small branches passing toward the periphery of the nerve. Following the sheath of these vessels, the bacilli had reached the pial sheath and had passed through this into the intervaginal space; here, however, they showed no tendency to proliferate toward the brain, but were carried down to the suprachoroidal space again.

These experiments show that under the proper conditions, micro-organisms can, in rabbits, be carried by the lymph stream from the vitreous of one eye to the space around the choroid in the other, and that the path taken is just what the experiments with amorphous powders have indicated—*i. e.*, from the vitreous into the orbit, along the central vessels, thence, outside the nerve, to the cranial cavity, thence down between the optic sheaths. Just where

the passage from the orbit to the cranium takes place can not yet be stated. This, it will be seen, differs materially from the view accepted by Deutschmann, who believes that the micro-organisms propagate in and between the sheaths against the stream, and in the first nerve itself up to the chiasma, thence down through the second nerve, its sheath and the space between them to the second eye. He speaks of finding them in the second papilla, and seems to have no clear appreciation of their direct passage from the intervaginal into the perichoroidal space. It is entirely probable that if he had been aware of the current passing out into the orbit, and had directed his attention to examining its course, the differences in our results would have been much less marked; and the same can be said of the observations of Alt (*American Journ. of Ophthal.*, 1884), who produced a sympathetic inflammation by using an infusion of jequirity. The preparations which Deutschmann has shown me at Göttingen, while exhibiting nothing contrary to the above facts, did not show enough of the central canal nor orbital tissue to confirm them.

We must now consider how far these results can be used in explaining the phenomena of sympathetic ophthalmia in man. First, with regard to the direction of the lymph stream from the vitreous, we can, as has been mentioned elsewhere, provisionally assume that a condition so little likely to be modified by natural selection, and occurring in animals so widely separated as cats and rabbits, also exists in man, their being no anatomical peculiarities to make it unlikely. This also holds good of the stream in the intervaginal space. When, however, we come to the passage from the latter into the space around the choroid, we have, in spite of the great difference in the development of the lamina cribrosa in man and rabbits, in support of the probability that the physiological conditions are similar, the well-known fact that the suprachoroidal space can be injected from the intervaginal space with ease; the papilla and retina, on the contrary, with difficulty or not at all. In explaining the clinical facts, the most difficult question to answer is: Why do we have no cranial nor orbital symp-

toms in sympathetic ophthalmia if the micro-organisms pass through these cavities on their way to the second eye? The answer is that there undoubtedly is a slight lymphangitis in the orbit, and a meningitis at the anterior part of the base of the brain, but that the lymph stream generally keeps the micro-organisms from collecting in sufficient numbers to do serious mischief at these points. In this connection we should keep clearly in mind the fact, well established in general surgery, that certain pathogenic bacteria, among them the pus-cocci, produce serious symptoms only where, from the anatomical or other conditions, they collect in considerable quantity. They pass from one part of the body to another, producing merely a slight lymphangitis on the way and causing no severe inflammation until they accumulate, as, for instance, in the lymphatic glands. Just so the bacteria from an infected human eye are probably carried along through the orbit by the lymph stream, and, on reaching the cranial cavity, are met by the current which sweeps down into the intervaginal and suprachoroidal spaces, their main damage being produced where they collect at the anterior part of the uveal tract. As an example of a fungus which spreads through the system in a different manner, the erysipelas-coccus may be mentioned. This produces a diffuse inflammation whereever it goes, almost without interruption; a fact which probably explains the meningitis which frequently attends its passage into the orbit.

Deutschmann has given an explanation similar to the above regarding the non-occurrence of brain symptoms, and it holds true whether we suppose that the micro-organisms enter the cranium through the optic foramen, or, as my experiments render more probable, through the sphenoidal fissure. That, under certain conditions, the lymph-current is insufficient to guard against serious trouble, is shown by the fatal cases occurring after orbital cellulitis, enucleation, and even suppurative iritis following discission. Whether the anthrax bacilli had spread beyond the immediate vicinity of the chiasma, in the first two cases mentioned above, cannot be stated, as, at the time of their oc-

currence, it did not occur to me to preserve and examine other parts of the brain. The severity of the symptoms and the congestion of the pia make it probable that in Case 2, as in Case 3, the bacilli had begun to spread out over the base of the brain, and that the animal would, if left to itself, have died of meningitis. The much more numerous cases in which the anthrax passed more slowly toward the brain, make it probable that Case 1, in which there were no signs of meningitis, and where the bacilli in front of and below the chiasma were very scarce, more nearly represents the average of what would occur if the animals lived long enough. In any case we should expect that a rapidly growing fungus, with but little tendency to be hedged in by an inflammatory exudation, would display a stronger tendency to overcome the safeguard offered by the lymph-current, than the more slowly growing micrococci which are probably the cause of sympathetic opthalmia in man, and which must reach the brain in much smaller numbers, as their passage from the injected eye is hindered from the start by the reaction which they excite.

As the fungi are carried down from the cranium between the sheaths of the first as well as the second eye, the former is subjected to a double infection, but as it is generally pretty thoroughly disorganized by the primary inflammation, this is generally of little importance. In the cases, however, where the first eye eventually remains the better of the two, we must suppose that it has acquired a certain immunity from the primary infection, and that its cells offer a greater resistance to the micrococci from the cranial cavity than is offered by the virgin soil of the second eye. The fact that the anthrax bacilli pass from the intervaginal space into that around the choroid, and not into the nerve or papilla, coincides with the secondary importance of the sympathetic neuritis, which probably occurs much oftener than was previously supposed; and which is not unlikely due to the passage of diffusible irritating matter along the vessels connecting the choroid and the lamina cribrosa.[1]

[1] It is not at all improbable that this neuritis and perhaps a slight iritis may be produced simply by the carrying over of irritating substances from the first

The fact that, at least in the rabbits obtainable in Erlangen and Zürich, the posterior lymph-channels are quickly closed against the passage of micrococci, gives us an important hint as to the non-occurrence of sympathetic trouble in many cases where one eye is infected, especially where the primary inflammation is violent. Leber and Deutschmann have sought the explanation of this non-occurrence after panophthalmitis, in the supposed destruction of the fungi by the violence of the suppuration and possibly in the emptying of the infectious contents when the eye bursts. That this explanation is probably incorrect is shown by the examination which I have made of several cases of panophthalmitis in rabbits. In these, cover-glass preparations, as well as agar cultures, from the interior of the vitreous showed that micrococci, perfectly capable of development under proper conditions, were present both in cases where the eye had burst; and where the inflammation had passed its height and marked phthisis had set in without rupture. As the phthisis advances the cocci grow rapidly less, but I have not determined the limit at which they disappear. The emigration of leucocytes is much less active in man than in rabbits, else we should probably have very little sympathetic ophthalmia, but there can be little doubt that our own lymph-channels become obstructed in the same beneficial way, when the inflammation reaches a certain height.

The cases of sympathetic disease, occurring many years after the penetration of the first eye by a foreign body, seem to be regarded by Leber as of doubtful genuineness. I mention, therefore, a fact which seems not to have been considered by him and other writers on the subject, namely, that it is well established in general surgery that foreign bodies may rest quiet in various parts of the body for years and eventually become the centres of an undoubtedly infectious inflammation.

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eye, though the micro-organisms may not have reached the second eye nor even the cranial cavity. This would afford the simplest explanation of the remarkable promptness with which enucleation sometimes affects the beginning of a genuine sympathetic inflammation. The cases of real sympathetic inflammation produced by intra-ocular tumors and cysticerci also probably belong here, if any such really occur.

Methods.

In the majority of the anthrax experiments the first eye was inoculated by injecting into the vitreous a small drop of sterilized water, containing a particle from an old culture composed of nothing but anthrax spores, by means of a finely drawn out, freshly sterilized glass pipette, which was either simply stuck through the sclerotic in the equatorial region, or was introduced through a small scleral incision. To prevent the inoculation of the subconjunctival tissue, from which the animals die so quickly, various expedients were adopted, mostly with little success. In Case 1, the pipette was carefully wiped off with cotton, damp with a strong solution of sublimate, after the water with the anthrax had been drawn in. This, however, was the only case in which the method was successful. In Case 2 a minute drop of sterilized oil was first drawn into the pipette, then the anthrax water, then another drop of oil. The pipette was then cleansed with sublimate and finally with sterilized cotton before being introduced into the vitreous. This device, which was first suggested to me by Dr. Hallowell of St. Paul, proved also efficacious in but a single case. The bacilli seemed to grow back into the subconjunctival tissue through the unclosed scleral wound. Finally, unfortunately just before it became necessary to discontinue the experiments, I hit upon a device which I give in detail, as it cost me many hours and rabbits, and may possibly save some other man a similar outlay: A glass rod is drawn out at one end, becoming thinest and slightly bent near, but not at, the point. A few anthrax spores are placed near the end and allowed to dry. The whole bit of glass beyond the bend is then covered with 8–10 layers of freshly prepared sterilized flour-paste, each layer being allowed to dry thoroughly in any warm place before the next is added. The first layers are best put on by fishing out a little paste with a platinum wire loop, through which the end of the rod is then passed. The rod is introduced into the vitreous through a scleral incision, and with the slightest pressure the end carrying the spores can be broken off and left at any desired point. In from two to ten days, accord-

ing to the thickness of the layers and the thoroughness with which they were dried, the starch swells and the spores develop. It economizes time to prepare several of the rods at a time, and always have at least one in reserve in beginning an operation. The method has the disadvantage of requiring the eye to be cut open and the glass removed before making sections with the microtome.

For staining the fungi, Gram's method was used almost entirely; the sections, generally, being previously stained with picrocarmine. Where celloidin was used for embedding, it was found necessary to dissolve this to get reliable staining for micrococci; for anthrax this is unnecessary.—[I mention here a point which has no connection with the subject, simply because it may possibly be of use to some one working on the retina. In staining by Gram's method the muclei of the outer muclear layer of the retina retain the staining much longer than all other cells except a few leucocytes, and where, as has occurred to me several times, the bacilli have been decolorized by too long soaking in alcohol, these nuclei still remain stained. The inner nuclear layer retains the coloring matter little if any longer than ordinary cells, and by first staining lightly with picrocarmine and then according to Gram the inner layer is stained red and the outer blue.]

Granting that sympathetic ophthalmia is an infectious disease, I am far from supposing that the foregoing settles the path taken by the micro-organisms in man. I merely assert that in rabbits the most direct and open path from one eye to the other, and that taken by the anthrax bacilli, lies not in the substance of the nerves themselves, nor in their sheaths, but leaves the first optic nerve with the vessels, passes through the orbit into the cranial cavity and thence *via* the subvaginal to the suprachoroidal space of the second eye. That the same course may be followed in man is certainly worth taking into consideration.

These investigations and those referred to in my paper on the lymph-stream were begun in the laboratory of Prof. Sattler at Erlangen, were nearly completed in the laboratories of Prof. Klebs and Prof. Horner in Zürich, and were

finished at Prof. Becker's laboratory in Heidelberg. I have to thank all of these gentlemen for friendly suggestions and for facilities placed at my disposal.

Explanation of the Plates.

The figures represent vertical antero-posterior sections of the optic-nerve entrances in Case 2. of the text. It should be remembered that the nerve in rabbits enters the globe obliquely from behind and below; also that the vessels leave the nerve much nearer the eyeball than in man. In hardening, the nerve of the second eye (Plate B) was bent to one side a short distance back of the globe, hence but a short piece is included in the section, and at the posterior border the dura is cut so obliquely as to appear enormously thick. In the manipulation of the sections the bacilli have mostly fallen out of the space between the sheaths; the arachnoid and the retina have also been mostly lost.

Plate A—Right (first) eye; Plate B, left (second) eye.

S = sclera; *Ch* = choroid; *Gk* = vitreous chamber; *Vc* = vena centralis (in Plate A with bacilli along its walls); *D S* = dural sheath; *P S* = pial sheath; *Oa* (Plate A) = mass of bacilli and leucocytes in supravaginal space; *Gk a* (Plate A) = similar mass filling the optic excavation and in the vitreous; *Ob* (Plate B) = bacilli being carried out into the orbit by the stream from the vitreous; *Ds a* (Plate B) = dural sheath so obliquely cut as to appear immensely thick.

CONTRIBUTION TO THE STUDY OF MYOPIA.

By Prof. Dr. J. STILLING, of Strasburg.

Translated (abridged) by G. A. Aschman, Sc.B., M.D., New York.

THE question of myopia is still growing in importance, although so much has already been written about it. It not only continues to be a subject of professional discussion, but interests almost the entire educated world. Governments solicit expert opinion as to school arrangements, and not only in school-boards, but in wider circles, a persistent agitation is perceptible. The reason of it lies, on the one hand, in the great influence which the question of myopia has acquired on the education of children, especially those of the wealthier classes, and, on the other hand, in apprehensions of the possibility of an increasing spread of myopia, threatening even to injure the efficiency of the army.

Almost two decades have elapsed since H. Cohn began the discussion of the subject. His numerous followers have not only confirmed the results of his investigations, but even increased his apprehensions by finding a higher percentage of myopia.

Of late years, however, a certain reaction has set in. Very conscientious investigators (Otto Becker,[1] Hippel,[2] and Hirschberg) have uttered opinions at variance with those of H. Cohn and his numerous followers. Tscherning[3] opposes them energetically in a statistical paper advancing new

[1] See Report of the Heidelberg Congress, 1883.

[2] "What Measures Are Required to Obviate the Frequency of Myopia in the Higher Schools?" See *Centralblatt für Augenheilk.*, 1884, page 248.

[3] "Studies on the Etiology of Myopia," *Graefe's Archiv*, vol. xxix., 1.

views. Lastly Donders himself, the originator of the whole movement by the statements to be found in his large work, has considerably modified his opinions. Whereas he formerly declared each myopical eye to be diseased, and in the spread of myopia saw a peril to the nation, he now, after a recent examination of the students of Utrecht, thinks the danger not so great, and concludes with the remark: "Even if I had the power, I would not banish myopia from the world."

I therefore believe that I commit no error by publishing the results of investigations which I have pursued during the last ten years. They have led me to side with the above-mentioned oculists, whose studies seem to initiate a certain reaction against the endeavors of H. Cohn and his followers. Not that I in any way intend to disparage the merits of this justly esteemed investigator, for the impetus he has given to the study of the anomalies of refraction is in itself sufficient to secure him the gratitude of his colleagues. However, in the twenty years that almost have elapsed since Cohn's first publications, views have gradually changed, although the value of former studies is fully recognized. I publish the following researches, conducted by only one person, without any further pretensions.

When, in the year 1866, Donders' classical treatise opened an entirely new field to physical diagnosis and, what was even more, physical therapeutics, the determination of refraction seemed to be subject to such exact rules, that every one, who through zealous study became acquainted with them, thought he had a good right to make investigations without committing any essential errors. The improvement of objective diagnosis by means of the ophthalmoscope by Jaeger and Mauthner necessarily confirmed this conviction.

Those, however, who for many years have been studying the anomalies of refraction, have come to the conclusion that the exactness of our statements is not mathematical, but only clinical. The eye is no purely physical apparatus, the construction of which can be determined in accordance with strict mathematical laws. It is a living organ, in which the accommodation frequently defies all calculations and

purely physical observations. This may occur even after attempts to paralyze the accommodation by means of homatropine or atropine, which, in cases like those in question, can generally not be done.

Before I proceed I wish to make some remarks about the subjective examination of refraction. The possibility of an incorrect diagnosis is certainly herein greater than in testing with the ophthalmoscope; however, as will be proved later on, errors may be committed even by the latter method—errors which can be rectified by the subjective examination. The exactness of both methods is only approximate, based on the correct examination of the single case, although the possibility of the examination depends upon purely physical laws, just like in auscultation and percussion.

To every practitioner it is an acknowledged fact that in the ordinary subjective examination the accommodation is easily subjected to an excessive strain. If a person is requested to lift a weight to a certain height, or to leap over a stretched cord, he will not measure off the precise force required and impart it to the proper muscles, but generally a greater amount; and this is especially the case in young individuals. What is admitted for the lifters of the arm and the muscles of leaping, must be admitted also for the ciliary muscle. If a young person be submitted to an examination, he generally overshoots the mark in his endeavors to comply with your demands. The normal eye in youth is hyperopic, and requires a certain accommodation in order to see distinctly at a distance. From sheer goodwill young people easily exert themselves too much and strain their accommodation, so that they seem myopic. In other cases the same effect is increased by a real spasmodic accommodation (which is not to be confounded with the real spasm of accommodation), or is wholly produced thereby. Such functional, apparent myopia attains to two dioptries in very many cases, but can even increase in exceptional cases to four dioptries.

The delusion indeed can often be revealed by means of the ophthalmoscope, especially if the latent hyperopia is of a high degree, but there are many cases of lower degrees,

where an examination with the ophthalmoscope shows more or less myopical adjustment, so that the same errors result from the objective as from the subjective examination. In many cases it even happens that the ophthalmoscope shows a stronger myopical adjustment than the test types show, so that the latter method corrects the former. Some years ago I gave a detailed explanation of these circumstances,[1] namely, that the light which is reflected by the ophthalmoscope produces a contraction of the ciliary muscle, which in different eyes can be so different, that the accommodation in some cases is almost entirely relaxed, whereas in others it is strained to a great extent. It is never entirely relaxed, because we cannot see the fundus of emmetropical eyes, a fact of which Mauthner gave quite a different explanation. I may add that these observations were confirmed in 1876 by v. Reuss, and later on by H. Cohn.[2]

We therefore come to the conclusion that in statistical investigations on a larger scale, where a great part of the determination is made and recorded only once, where by far the larger number of those examined are at once lost sight of, and where no homatropine or atropine has been used, there results a greater or less number of errors. It must be supposed, and this supposition has become a certainty to me, that among the great numbers of low degrees of myopia, which fill the right-hand columns of all statistical tables, there are many cases of hyperopia of low, and sometimes even higher degree, which when eliminated would decrease the percentage. As an interesting example I may be allowed to cite the following case: One of my older scholars, who was functionally emmetropic, but in whom the ophthalmoscope revealed unmistakable hyperopia, was formerly one of the ten thousand school-children examined by H. Cohn, who had declared him a myope, and had ordered him to wear concave glasses. Such a case surely stands for many, and if such an error happened to H. Cohn in his fundamental work, it may safely be supposed

[1] "The Ophthalmoscopical Determination of Refraction." See *Clin. Monatsbl.*, 1875.

[2] "Hygiene of the Eye," page 66.

that it happened oftener to his followers. I myself make no exception, and am sure that in my examinations many such errors have been committed, and that it is impossible to avoid them entirely.

The same conclusions as to hyperopia can be drawn with regard to myopia, especially of low degree. Here also the accommodation is strained excessively, as young patients easily make too great an accommodative effort, or having acquired a spasm of accommodation, tax the latter to an undue extent, and thus simulate a myopia of higher degree. Here also the ophthalmoscope very often reveals the error, but occasionally fails, so that extensive statistical examinations are very liable to contain mistakes. This is especially the case in astigmatic eyes, which may appear myopic, though only an innocent anomaly of curvature exists, or there seems to be a higher degree of myopia, while in reality it is insignificant. Such eyes very often have normal sight with concave glasses, and only a repeated and careful examination shows that this could be accomplished just as well or better with simple cylindrical glasses, or the latter combined with weak concave glasses. Whether this may be attributed to the contraction of the pupil in the effort of accommodation, or to an astigmatic change in the form of the lens, which neutralizes the astigmatism of the cornea, is not quite sure; but it is a fact that people with Asm = 1.25, or with M = 1.25, Asm = 1.25, may seem to have a myopia of 2–6 D with full sight.

The reason why I look upon these facts, which I already described in my paper nine years ago, as an especial source of error in statistical examinations of myopia, is the remarkably small number of astigmatic eyes generally cited. H. Cohn counts among his ten thousand school-children only twenty-three with astigmatism. This small number is not remarkable, because at that time the extent and significance of astigmatism had only two years before been recognized by Donders and Knapp, and low degrees were thought to be of small account. But even in recent investigations very little is to be found of it. Seggel[1] even says that he could

[1] "Acuteness of Vision," etc. See *Graefe's Archiv*, vol. xxx., 2.

not dwell on the precise determination of astigmatism, because the people examined were not intelligent enough. My own investigations, however, taking into consideration the circumstances previously mentioned, show a strikingly high percentage of astigmatic eyes. I also carefully noted those who had hyperopic astigmatism—cases of frequent occurrence,—but did not introduce them into my calculations, because the number of cases of simple or compound myopic astigmatism was so surprisingly large. The errors which result from neglecting astigmatism are increased in cases of hyperopic astigmatism, where a spasm of accommodation may simulate simple and compound myopic astigmatism. The remarkably small number of persons with hyperopic astigmatism,[1] noted in recent investigations, strengthens my conviction, that they often figure in the columns of myopia of low degree.

By using atropine we might eliminate these mistakes almost entirely. But even then we have no absolute guaranty. The accommodation may be paralyzed for near vision and yet be spasmodically strained for distant vision, or the reflected light of the ophthalmoscope may produce contractions of the ciliary muscle. In statistical examinations, however, atropine is generally not used.

Finally, I desire to make some remarks about the objective determination of refraction. It is also to a certain degree subjective. The examiner, who says he can surely relax his accommodation has only his personal experience and the uncertain muscle-sensation to rely upon. To prove that a certain portion does not remain is impossible. I willingly believe my honorable colleague, who has myopia of 5 D, that he can relax his accommodation with greater certainty and ease than myself with a slight hyperopia, but I am just as sure that there are many other examiners who are not quite certain of being able to relax their accommodation entirely. But then the determination is subjective, and it depends upon the power of distinction and the acuteness

[1] Only in Dor's "Hygiène oculaire au Lycée de Lyon," 1878, I find a great many recorded; also myopic astigmatics. This seems to me to account for the small percentage of myopia in Lyons.

of sight of each observer, if and with which glass he can clearly see the image of the fundus.

It may be objected that this is all very pedantic; that it has been often stated that the ophthalmoscopic determination of refraction was not mathematically exact, but that it was of small account if half a dioptry more or less were recorded, and that essential errors were rare in daily practice. This is, I admit, quite true in regard to daily practice. If a mistake should be made it can always be corrected in a subsequent examination. But with statistical examinations it is quite a different thing, as they generally can be made once only.

What I want to say is this: The slight errors which one is bound to commit, on account of the only approximate accuracy of diagnosis, increase the number of cases of low degree of myopia in statistical tables. It was this great number of cases of low degree of myopia which first induced H. Cohn to attach so much weight to the whole question. According to him, high degrees are not of frequent occurrence, but the lower ones originate in school, and by their progressive tendency become destructive.

These views, which are probably based upon Donders' sentence, that "every myopic eye is a diseased eye," have been recently contradicted by Tscherning, and the attempt has been made to set up different forms of myopia. Tscherning assumes three: the first one up to 2 D, physiological variety, depending upon an obnormal curvature of the cornea; the second one up to 9 D, the actual working-myopia, gained by adaptation; and, finally, the destructive form.

That a myopia of low degree exists, which must be considered a physiological variety, must, of course, be admitted, and I can only agree with Tscherning, who argues that it would be curious if, among the many cases of compound myopic astigmatism, one could not find some eyes in which the abnormal curvature of the cornea would be the same, or almost the same, in the two principal meridians. It has been said that myopia does not exist in uncivilized countries, but it must not be forgotten that our determina-

tions of sight are only empiric and dependent upon the conditions under which we live. In people leading an out-door life, acuteness of sight can even be three times the normal, and low degrees of myopia can therefore be easily overlooked. On the other hand, the eyes of mammals are hyperopic, and the normal eye in childhood is also generally hyperopic to a considerable degree. The question may therefore be asked whether many cases of myopia of low degree may not have been developed during the period of most rapid growth ; nay, even whether emmetropia does not belong here. This opinion might be accepted when we consider that the higher degrees of working-myopia must have first passed through the low ones. Myopia up to two dioptries must not therefore be simply disregarded. In assuming the second form of myopia, embracing cases extending up to 9 D, Tscherning was certainly quite right. Daily experience shows that this form is chiefly to be found amongst the learned classes; that as a rule the ophthalmoscope reveals only a narrow, clearly outlined staphyloma post.; that these eyes are healthy and fit for any kind of work; and that, after having attained a certain degree during the period of growth, the myopia remains stationary. This adaptation can hardly be regarded from a Darwinistic point of view, but may rather be compared to the similar changes that take place in the legs of riders and the hands of piano-players.

The last class, finally, that of destructive myopia, has been justly treated by Tscherning as quite distinct from the other two. My examination of a number of school-children, in 1875, showed that it is irregularly scattered through all classes; that it can be found even in small children, and often only in one eye, the other being normal. This experience not only agrees with Tscherning's statistics, but also with the results of daily practice. The third form is found very often in people belonging to the lower classes, and in children. It must therefore be concluded that it is not caused by working at short distances, but that it is mostly inherited or brought on by general debility.

The existence of three different forms of myopia seems to

me, according to my examinations and experience, to be quite beyond doubt. First, in myopia of a low degree, up to 2 D, a physiological abnormity or variety, which appears during the period of growth without increasing. Secondly, a myopia acquired by near work. I believe that Tscherning has unduly extended the limit by placing it at 9 D, and that only 6, exceptionally 7 D, should be assumed. But of course these groups cannot be precisely limited.

The statistical columns of low degrees of myopia are therefore not reliable in view of the statements made above.

Before communicating my own figures I wish to make some remarks about the acuteness of vision of myopes. I find, contrary to other authors, that it is not very often diminished. Proper care must be taken in looking for complication with slight astigmatism. After the accommodation has been relaxed the acuteness of vision will frequently rise to 1, where it had been less on account of spasmodic accommodation and insufficient correction. Seggel's[1] accounts of diminished acuteness in myopia must therefore be received with caution, and are probably explained by the lack of intelligence shown by his patients, so that they could not be properly tested for astigmatism. Seggel's assertion, that in myopic astigmatism it is rare to find S = 1, does not agree with my experience.

It is a fact that eyes with S = 1, which is less than the normal in uncivilized nations, are healthy, and can remain so during life. Acuteness of vision, like all other functions of the human body, is probably subject to the same law of nature: unless it is fully exercised it deteriorates. It would be of great interest to discover whether myopes do not possess a greater power of vision at short distances than emmetropes. Many facts seem to support this supposition, which could only be proved, however, by examinations with specially constructed visual tests.

The total number of pupils examined by me was 2,359. The result of the examination is shown in the following table:

[1] *L. c.*

	No. of pupils.	Myopia.	
		No.	%
1. Seminary for young ladies in Strasburg .	57	3	5
2. Seminary for teachers in Strasburg . .	77	20	27
3. Realgymnasium St. Johann in Strasburg .	312	24	8
4. Protestant Gymnasium in Strasburg . .	740	53	8
5. Realgymnasium in Cassel . . .	592	102	18
6. High School for young ladies in Cassel .	551	93	17

Cases of myopia in only one eye have been omitted, which I was certainly entitled to do, as such persons can more justly be regarded as normal-sighted, than a hypermetrope with uniocular weakness of sight, or a normal-sighted person with corneal opacities, etc.

Though the percentages vary in calculating the whole number of cases of myopia, they are almost equal considering only that group which must be regarded as specially dependent upon near work.

My percentages are considerably lower than those found by other authors. If the objection should be raised that this was merely the result of chance, I of course could not directly prove the contrary. But the above-mentioned conditions regarding the determination of refraction seem to argue against it. My numbers do not differ very much from those of Cohn, the latter being not so very high. He found in two technical schools only 19.7%, I, in the Cassel Technical Lyceum, 18%; I included, however, many cases of myopia $= \frac{1}{40}$, which Cohn omitted.

I believe his numbers would have been yet smaller, and the differences between our lyceum examinations in particular would have been slighter, if he had had a sufficient knowledge of astigmatism and its deceptive influence upon the determination of refraction, which was not possible in those days. While Cohn records among his 10,000 school-children only 23 with astigmatism, I find a much larger number. In the Protestant Lyceum in Strasburg, there were among 180 myopic eyes 33 complicated with astigmatism, and besides these, 21 with simple myopic astigmatism, many

of whom at first appeared to be myopic, even highly myopic, and were only found to be astigmatic after having been repeatedly tested. In the teachers Seminary in Strasburg, among 40 myopic eyes 10 were found to be astigmatic, *i. e.*, one fourth. In the highest class of the Cassel Gymnasium there were among 18 myopic eyes 17 with astigmatism, besides one eye with simple asm. Among 102 myopic eyes in the high-school for young ladies in Cassel, 34 were complicated with asm., and besides that, not less than 33 eyes with simple asm., some of which when first examined seemed to be myopic. In the Technical Lyceum in Cassel, among 227 myopic eyes, 40 were complicated with astigmatism, and 26 others showed simple asm. If I add that I found very many cases of simple hyperopic astigmatism, and finally some cases of mixed asm., which did not count, and many of which under the influence of an accommodative effort might easily be mistaken for cases of myopia of low degree, the great difference between my percentages and those of other authors is easily explained. Even Tscherning's figures, who tested only with the ophthalmoscope without atropine, must be too high.

In the curves, which indicate the progression of myopia in every school, my observations also agree with those of Cohn. Cohn's assertion, that the number of myopes and the degree of myopia increase from class to class, is in general correct. But the construction of the curves showing the progression of myopia in a school are of little value, as they are too easily influenced by chance. The curves representing the different groups of myopia are more important. Irregularities cannot be avoided, as a strict division cannot be carried through. But in accordance with what I have said above, we may assume the following three groups:

1. *Myopia of low degree up to* 2.0 *D* ($\frac{1}{40}-\frac{1}{17}$ *inch*). The determination is the most uncertain, as this group can contain physiological cases of myopia, of myopia of lower or higher degree, the result of adaptation, cases of destructive myopia, and finally a number of cases of hyperopia, etc.

2. *Myopia from* 2 *to* 6 *D* ($\frac{1}{16}-\frac{1}{6}$ *inch*). This group can also

contain physiological varieties, but the determination of each case is more reliable, and in the majority the myopia is the result of adaptation. In entering the numbers from the different schools I fixed upon 3 D as the lower limit of working-myopia, because at that point the determination is almost absolutely reliable, but in constructing the curves I accepted 2 D according to Tscherning's division, so as not to complicate matters.

3. *Excessive myopia*, which begins, according to my ideas, with 7 D.

The curves of the first group resemble those of the total progression so much, that I omitted the latter, so as not to have too many plates. (They are to be found in the third plate, compared with those of the second group without the variations.) In this group the increase is never gradual, and chance probably can only account for the sudden enormous elevations and depressions. The increase is greater where the determination of refraction is more uncertain, as in the low degrees of myopia. This irregularity has yet another cause. According to the differences in growth, those cases of slight myopia, which we regard as physiological varieties, develop sometimes very early, sometimes only at a later age. But even if we only unite the lowest points of the curve, the latter is seen to increase in the whole in a marked and regular manner. The reason of it is, that the eyes of the pupils of the first class have grown longer than those of the pupils of the sixth class, a result of their normal growth, except those rare cases which show the first stages of destructive myopia with an already developed posterior staphyloma.

The curves of the second group are different. The variations are much slighter, and if the lower points of the curves are united, a steady but slow rise can be observed, through many classes. Chance probably also plays a certain part, but in accordance with the development of working-myopia it is of much less account. The great increase in the higher classes must be referred to the combined action of growth and adaptation.

The third group, finally, shows irregular curves without

any steady progression, with an increase and then again a decrease down to zero.

It is therefore evident that the entire number of cases of myopia rises *very irregularly*, that its progression grows less and more regular in advancing towards the middling and higher degrees, and that finally in the highest degrees there is no real progression at all.

Though Cohn may be right in saying that the number of cases of myopia increases in general from the lower classes up to the highest, and I do not dispute that on an average more myopia of a higher degree is found in the higher classes, the importance of myopia nevertheless must not be over-estimated in a social point of view. *Most cases of myopia are of a low degree and harmless; only the smallest part is seriously progessive. The highest degrees must be regarded as a real disease, which can only be made dependent upon the influence of the schools, and especially high-schools, inasmuch as it can only be injurious to a diseased eye to be strained.* The existence of this form of myopia in the lower classes of society is deplorable. Every day in our clinical experience we meet with those lamentable cases, where seamstresses, workmen, persons employed on railways, are threatened with loss of sight by hemorrhages or detachment of the retina, and who are much more to be pitied than well-to-do persons, who, as deplorable as their fate may be, are at least protected from misery and want.

Slight myopia is not an evil, whereas that of a high degree is a very great one; it belongs to the chapter of state hygiene and has nothing to do with higher education. As to the middling degrees, which are due to adaptation of the eye to the unnatural demands of near vision, it can be disputed whether or not they are an evil, even if with the increasing demands of civilization they should spread more than is now the case. But even if this be admitted, it must be confessed, on the other hand, that this working-myopia, compared with the large number of greater evils to which the human body is exposed, is a very trifling and bearable one, not at all calculated to give cause for alarm.

It does not seem that near work under unfavorable con-

ditions of light in particular, combined with other injurious influences, is the cause of myopia, but it is far more the unnatural demand of near work in itself. Cohn himself assumes that the acquirement of culture in general produces myopia. Not even a great amount seems to be necessary, if the high percentage found by Reich in the Russian and Armenian gymnasiums, are taken into consideration. I believe, however, that Reich's numbers are at least 50% too high. I cannot avoid recalling Cohn's examination of the Nubians, where only the priest, who could read and write, was myopic. If really a causal connection exists here, the conclusion must follow that prevention of myopia and abolishment of any labor of culture, were synonymous. I have found, besides, many more cases of myopia in the new school-palaces than in the old buildings, with the exception of the Strasburg seminary for teachers. That however bad conditions of light, bad print, etc., influence the development of myopia, cannot be denied, because greater efforts are required to adapt the eye to unfavorable than to favorable conditions. But the influence of these factors is probably not very great. At all events the results of my examinations are diametrically opposed to those of Florschütz and others.

As to the complaints of myopia in the (German) army, it is evident that the whole system is responsible for it. The higher schools are over-crowded at present with a great many young men who desire to obtain a diploma conferring the privilege of serving only one year, and who are very often not sufficiently gifted for the studies they must pursue. They are therefore obliged to exert themselves all the more, and thus, by adaptation, acquire myopia. The investigations of Tscherning have shown that this form of myopia exists also in the lower classes of society, in persons who are occupied with work at short distances. To be consistent and not to impose too many sacrifices upon the entire population in favor of the higher classes, Cohn's proposed hygienic measures, the rationality of which I do not dispute, would have to be introduced into workshops, factories, etc., etc. So much the more is Hippel[1] right in saying,

[1] *L. c.*

that if any thing could be accomplished against myopia by the introduction of hygienic measures into the schools, it would require the increasing efforts of generations. The demands made upon the intellectual development of our children cannot be lowered without damage to the commonwealth. The equal development of mind and body is certainly the greatest aim of civilization. But to attain this the continuous mutual activity of physicians and schoolmen is necessary and one-sidedness must be avoided.

I recapitulate my investigations by admitting that myopia is rather frequent, but not as frequent as the followers of Cohn have asserted; that these assertions are based upon the uncertainty of statistical determinations of refraction; and, finally, that the actual working-myopia of 3–6 D, only amounts to about 5 %. The results of Cohn, with the restrictions above mentioned, are correct, but have been distorted by his followers. As for the rest I agree with the investigators cited at the commencement of this paper, not forgetting that the latter only presents the results of the investigations of one man.

Explanation of the Plates.

The abscissæ of the curves represent the classes, the ordinates the percentage of myopia.

Plate I.—Course of low degrees of myopia from $\frac{1}{40}$ to $\frac{1}{17}$.

1. Technical Lyceum, in Cassel.
2. High-School for Girls, in Cassel.
3. Technical Lyceum in Strasburg.
4. Protestant Lyceum in Strasburg.

Plate II.—The numbers refer to the same schools as in Plate I.

1–4. Course of myopia from $\frac{1}{16}$ to $\frac{1}{6}$ (by adaptation).

1*a*–4*a*. Course of excessive myopia.

Remark: In 3 there are no cases belonging to this chapter.

Plate III.—Comparison between the curves which indicate the entire progression of myopia and those which indicate the progression of myopia from adaptation ($\frac{1}{16}$ to $\frac{1}{6}$). The variations represented in the other plates are omitted here and only the lowest points of the curve united. The resemblance of the curves is very obvious and cannot be the result of mere chance.

1–4. Entire progression.

1*a*–4*a*. Progression of myopia from $\frac{1}{16}$ to $\frac{1}{6}$.

ON PURULENT OPHTHALMIA AND ITS TREATMENT BY HOT-WATER APPLICATIONS.*

By ALBERT G. HEYL, M.D., of Philadelphia.

THE bacterial origin of many diseases is no longer a speculation, but a substantial fact. At the present time the science of the subject is far in advance of the clinical applications; and yet the latter are of profound practical importance to every physician. Diseases like croup, phthisis, cholera, etc., will probably only be successfully treated from the standpoint of the mycologist, and it becomes therefore a matter of great practical moment to understand the phenomena which follow the settling of micro-organisms in living tissue and the effect of treatment in modifying the same. The conjunctiva offers the best surface in the body for such studies, and I might very profitably spend the time allotted to me in detailing the clinical phenomena which occur in connection with different forms of bacterial infection of this membrane. I propose, however, to direct attention to the effect of hot-water applications in ONE form of bacterial conjunctival infection, viz., that commonly known as purulent ophthalmia. It will be necessary to make some general statements with reference to recent researches in regard to this disease.

Purulent ophthalmia is a disease of the conjunctiva characterized by great swelling of the lids, profuse purulent discharge, with a marked tendency to corneal ulceration. As it commonly occurs in newly born children, it has received the name of ophthalmia neonatorum; again, it occurs

* Read before the State Medical Society of Pennsylvania, June 3, 1886.

in adults as the results of infection with gonorrhœal matter, and hence the name gonorrhœal ophthalmia. They are essentially the same disorder, caused by the same germ, and ought to be discussed under the same head. Mycological research seems to indicate that there is a form of virulent conjunctivitis in the newly born child which may be confounded with the bacterial conjunctivitis. Perhaps we may be able clinically to differentiate the two. In this paper I am discussing the bacterial form.

The disease is very destructive of sight. Statistics of blind asylums show a percentage variously stated of from thirteen to forty-six per cent. of inmates rendered blind from this disease, and these statistics do not take into account a large number of cases of monocular blindness which have not been obliged to seek the refuge of the asylum. The disease is therefore of great importance to the community at large and also to physicians in general practice, for these cases almost always necessarily fall into the hands of the general practitioner at an initial period of the disease. The interest in this disease has been greatly enhanced since Neisser (1879) discovered the germ which is its cause. Various observers having confirmed the results of Neisser's researches, this "gonococcus" to-day is perhaps one of the best understood of the micro-organisms that infest the human body.[1] Let us consider a few points brought out by these researches:

1. *It attacks the cylindrical epithelium of the conjunctiva, leaving the pavement epithelium untouched.* Two years ago[2] I called attention to the physiological distinction between two sections of the conjunctiva, viz., the palpebral and sclero-corneal sections. The former I believe to be a lubricating organ, the latter an essential part of the apparatus of sight—*i. e.*, without it the function of sight could not be properly performed. Now the interesting point in this connection is that the palpebral conjunctiva has *cylindrical* epithelium, while the sclero-corneal section has *pavement* epithelium. Recalling now the fact already stated, *that the*

[1] *Vide* the monograph on the "Gonococcus Neisser," by Dr. Ernst Bumm, published by J. F. Bergmann, Wiesbaden.

[2] "Transactions of the Medical Society of the State of Pennsylvania," 1884.

gonococcus attacks the cylindrical epithelium, we come to this conclusion, viz., that the palpebral conjunctiva is the culture-ground of the coccus. The rule with regard to applications of nitrate of silver in this disease, viz., that they are to be applied *only* to the palpebral conjunctiva, is now perfectly explained. It is because we then attack the position in which the coccus finds the condition necessary for its growth.

2. *The growth of the coccus depends on the age of the epithelial cells.* The process seems to be essentially this: The coccus finds its way into the conjunctival sac, lays hold of the cylindrical epithelium, disintegrates it, and then finds its way into the subepithelial tissue; at this stage it ceases to grow; by and by the destroyed epithelia have been replaced by new cells, and as soon as this happens, the propagation begins again, until the new cells have been destroyed; and thus the process goes on. In other words, cells in the early stage of development furnish no proper nutriment for the coccus. Again, we find an explanation of a therapeutic procedure developed by the great clinical genius of Von Graefe, viz., that following the destruction of the superficial layer of epithelial cells a cessation of the virulence of the inflammation is observed; presently with the regeneration of the epithelium the inflammatory symptoms increase in violence. If, previous to this latter stage, *fresh* applications of the nitrate be made, the imflammatory relapse can be prevented. In the light of the mycological researches the reason of this is evident, viz., by the applications of the nitrate we are keeping the cells of the tissue in a young state unfavorable for the growth of the coccus; it ceases to grow, dies, and the disease is cured.

3. *The vitality of the cell affects the coccus.* By vitality is meant that property of the cell which is concerned in the increase in bulk or area of tissue. In the young child this vitality is such that the frame increases in size, the cell multiplication taking place to such an extent that the organs grow. In the adult the organs retain their bulk, disintegration and repair of tissue being about in equilibrium. Now, the essential principle involved in this

is the vitality of the cell, and when this is weak we have a condition relatively favorable to the growth of the coccus, and *vice versa.* I deduce this from the clinical fact that gonorrhœal conjunctivitis of the adult is a much more virrulent disease than blennorrhœa neonatorum. Perhaps it might have been deduced from the preceding point, viz., that relating to the age of the cell, but a young cell is not necessarily highly vitalized.

4. *The coccus is not merely confined to the palpebral conjunctiva, but finds its way into the lymph circulation,* and is swept into regions where it finds no sustenance, but, accumulating in masses, blocks up the nutrient channels. I believe the corneal ulceration is the result of such blocking. The cocci are carried into the connective-tissue spaces underneath the scleral conjunctiva, lifting it up into mound-like prominences. These mound-like prominences vary in extent; not uncommonly they completely girdle the cornea. Probably the swollen retrotarsal fold is caused to a great extent in this way. The cocci are transported into another locality, viz., into the substantia propria of the cornea. Here is an unyielding tissue. The cocci simply block up the nutrient channels, necrosis of the involved area occurs, resulting in the deep, well-defined ulcer of this disease.

According to the foregoing remarks, two distinct objects are to be kept in view in the *treatment:* 1. To stop the growth of the coccus. 2. To prevent the coccus from accumulating in the cornea, where it does harm, not by its directly ravaging the tissue, but by blocking the nutrient channels.

The disease being caused by bacterial infection, the question naturally arises: Can it not be successfully treated by dropping some antiseptic into the conjunctival sac, and thus destroying the gonococcus? I know of no such substance. It is, in my judgment, an error to suppose that, because a given substance will sterilize a flask swarming with gonococci, therefore, the same gonococcus will be destroyed by this agent when growing in the conjunctival sac. The conditions of growth may be altogether different in the two cases. The truth is that the antiseptic treat-

ment of living tissue is a very much more complicated process than is commonly supposed. The treatment by nitrate of silver has already been alluded to. Its essential is that the cells of the palpebral conjunctiva are kept in a young and probably highly vitalized condition, and therefore the coccus, finding no sustenance, dies, and the disease is cured. Properly applied, it is the best-known treatment for this disease, so far as the palpebral conjunctiva is concerned. Unfortunately, it requires a skilled hand to apply it. I have been led, therefore, to use also in this disease *hot-water applications*, which can be readily applied by the attendants of the patient. Hot-water applications are an old remedy in ophthalmic surgery; they have been used by others in this disease, but the rationale of their action is perhaps unknown. The action of heat upon living tissue may be studied from two aspects: 1. Its direct action upon the cells of the part. This therapeutically belongs to the theory of the actual cautery. 2. Its indirect action; this affects the cells of the tissue through the circulating fluids; the latter being warmed and coming in contact with the tissue cells, induces increased activity and cell proliferation. This is shown microscopically by the effect of heat upon the living cell, likewise clinically by the fact that by proper application of heat to the eyelids the cornea can be vascularized.

The use then of heat in certain forms of bacterial infection will be understood, viz., that by so acting indirectly upon the cells of the part, the tissues are placed in a condition unfavorable for the growth of the bacterium. Oertel's[1] experience in the use of hot steam applied to diphtheritic deposits exemplifies this. Oertel's observation, in brief, is as follows: In a certain infected tissue we may observe the diphtheritic deposits shading imperceptibly into the surrounding tissue. If now hot steam be applied to this tissue, it will be noticed that the deposits become distinctly circumscribed; along with this, new deposits seem to form, and we might suppose that the deposits were increased in number by the application. This, however, is a mistake; it is

[1] Ziemssen's Encyclopedia, vol. i.

simply owing to the fact that the whole tissue has been infiltrated, and the heat is simply circumscribing different foci, many of which previously were unrecognizable. The process goes on until finally the central masses of infiltration are thrown off, a layer of pus cells being formed at the plane of separation. Oertel says the heat induces suppuration, and thus the pseudo-membrane is cast off. To my mind the explanation is not sufficiently explicit or accurate. It looks to me as if the heat acted on the tissue in such a way that the bacterium found no proper sustenance and died. In many places, however, the tissue cells had been so affected by the parasite that restoration was impossible; these constituted the sloughs. At the plane of union of the slough and underlying tissue the cells were in a partially normal condition, and yet incapable of restoration. These were mainly concerned in the formation of pus. Underneath these again were cells which, under the influence of heat, maintained their integrity.

We are doing with these hot applications essentially the same thing as with nitrate of silver—putting the cells in such a condition that the coccus ceases to live. Practically, under their use the swelling subsides, the discharge becomes less, and the disease is checked. There is, moreover, one phase of this disease to which the hot applications are peculiarly adapted, viz., when the coccus accumulations form underneath the scleral conjunctiva, or in the corneal tissue itself. In this condition the nitrate can only act by preventing further coccus propagation, and, perhaps, in a measure, through its action on the palpebral cells, by increasing to a certain extent the force and velocity of the lymph stream, thus tending to disperse the coccus accumulations. The hot applications are vastly more efficacious for this purpose, and it is my own practice, when the corneal cloud has formed, to suspend the nitrate and rely upon the hot applications. In this way I have seen corneal opacities, on the verge of breaking down in ulceration, dispersed. It is possible that, even at this stage, the nitrate of silver, if carefully neutralized with a solution of salt, might be used with advantage.

The point, then, which I wish prominently to bring forward is, that in hot water we possess a remedy that *requires no special skill in its application*, acts in regard to the palpebral conjunctiva on the same principle as the nitrate of silver, and is of especial value when the cornea is involved.

There is one thing to be said with reference to the application of heat in gonorrhœal ophthalmia of the adult. In these cases I have missed the rapid yielding to the treatment which is noticed in the infant. The disease is of a very much more violent grade in the adult, probably for the reason already stated. I have employed the hot water very actively and persistently without noticing immediate relief from it. The disease finally subsided, but by no means rapidly. I believe, however, that the best treatment at present for this virulent form is the repeated applications of weak solutions of nitrate of silver, carefully neutralized, say, every three hours, with constant applications of hot water.

The method of applying the hot water is as follows: A basinful of hot water, as hot as the hand can comfortably bear it, is placed by the patient, a handful of absorbent cotton dipped into it and applied to the closed eyelids; as fast as it cools, which may be in a quarter of a minute, it is reapplied. The applications are kept up for five minutes at a time; in infants, three times daily is sufficiently often for these applications. In more virulent cases they may be used oftener.

DARK ROOMS AND BANDAGES DISCARDED IN THE AFTER-TREATMENT OF CATARACT-OPERATIONS, IRIDECTOMIES, ETC.

By CHARLES E. MICHEL, St. Louis, Mo.

AT the recent meeting of the American Medical Association, held at St. Louis, Mo., the question as to the best method of conducting the after-treatment of our operated cases, especially cataracts and iridectomies, was discussed in the section on ophthalmology, during which Dr. Julian J. Chisolm, of Baltimore, Md., reported a conversation which he had had with me on this subject, and gave the method pursued by myself in such cases for the past twelve or fifteen years.[1] Being absent at the time, I was subsequently called upon by several members of the association anxious to learn the details and results of my practice. This leads me to believe that a communication on the subject may not be without interest, and moreover serve to bring this important question directly before ophthalmologists for discussion. While pursuing my studies in Paris in 1857, with Demarres and Sichel, it occurred to me that there were no good reasons for the dark room and bandages then and yet in general use after operations, and I determined as soon as possible to test the question for myself.

Soon after my return to the States the war commenced, and I had but few opportunities to put my conviction into practice, but the cases treated at long intervals between 1861 and 1870 so strengthened me in my belief that I soon

[1] See report of proceedings, Ophthalmological Section Amer. Med. Ass'n, May number of *American Journal of Ophthalmology*.

after entirely emancipated myself from the old routine, and now for the past twelve or fifteen years have discarded bandages and darkened rooms. So far I have only had to congratulate myself on the results, besides experiencing much satisfaction in having materially diminished the trying ordeal which necessarily follows some of these operations. In common with many ophthalmologists, I operate on healthy individuals without any preparatory treatment, but whenever there are indications for tonics, etc., the previous improvement of the constitutional condition is carefully attended to. Since the introduction of cocaine I almost invariably make use of it, applying a 4 % solution four or five times, at intervels of about three minutes. I may mention here that when from some cause the operation has been delayed, in the neighborhood of twenty-five to thirty minutes after the first instillation of cocaine, I have found that a reaction takes place, and acute pain is frequently felt notwithstanding that the instillations of the cocaine solution have been kept up, and therefore a larger quantity of the remedy used. When from nervousness or timidity the patient is deemed unreliable, or the nature of the operation makes cocaine impracticable or unsuitable, I always administer chloroform. I use no antiseptics or germicides, either before or after the operation, having been perfectly satisfied with the results of the scrupulous cleanliness that I always have exercised both with regard to patients and instruments ; in other words, I only practice asepticism, believing that many complicating inflammations necessarily must have been induced by some of the irritating applications to the eye employed to ward off a supposed danger of germ infection. For my part I prefer to take the remote chances of a germ infection to running the risk of the consequences of a positively irritating application to an eye which is immediately to undergo a hazardous operation. I perform a modification of Von Graefe's operation, with a rather large iridectomy, closing the eye with a single piece of gold-beater's skin (Taffetas Français). The strips are cut one and a quarter inches long by one half inch wide, and are applied across the centre of the palpebral fissure, care

being taken not to close the lids too accurately, as a slight opening favors the gradual escape of the secretions. We thus avoid those very painful and irritating periodic gushes of pent-up secretions, complained of as "scalding tears" by the patient. The strips extend only from the integument of one lid to that of the other, and in this way the transmission of the movements of the facial muscles to the eyelids is avoided. No other dressing is applied. A few patients complain of disagreeable twitching of the eyelids immediately after the operation; a handkerchief lightly thrown over the eyes relieves this; it is allowed to remain only a short time, being removed as soon as quiet is restored, in half an hour or less. After a regular operation no atropine, eserine, pilocarpine, or other instillations are used, nor do I use any opiates, etc., never having had a patient so restless as to imperatively need such disturbing medication. Absolute rest on the back is enforced, the head being moderately raised. The bed is generally turned away from any glaring light, and the windows not shaded any more than at other times in the bedrooms. The amount of light borne with comfort by different persons varies from a subdued one, in which reading at the bedside of the patient is easily accomplished, to the clear light of the northern sky, such as is adapted for cataract operations. A patient successfully operated on without accident or pain three weeks ago [May 13th], remained from preference throughout the entire after-treatment in the identical position where the operation had been performed, viz.: with his head three feet from a shadeless window facing north. This man was seventy-one years of age, and had a chronic catarrhal irritation of the conjunctiva, the result of granulations treated many years previously. The cornea after healing was covered at its upper quarter by a fine network of vessels, which were evidently enlarged capillaries left after a pannus which had formerly existed. It would seem if such a case as this could be successfully treated by the method, it should certainly answer in less complicated ones. When the secretions are at all abundant, I do not hesitate to remove the plaster twenty-four hours after the operation,

carefully cleansing the margin of the eyelids and putting on a fresh strip. This, however, is not ordinarily done until about the third and each successive day, such dressings being exceedingly grateful to the patient. On the fourth or fifth day the patient is allowed to turn on the unoperated side to relieve the aching produced by the dorsal decubitus, and from the sixth to the eighth day he is bolstered up in a sitting posture in bed and the eye not operated on left open. From the ninth or tenth day the operated eye is no longer closed, and the patient is dressed and permitted to leave the bed for a chair. The next day he goes about the room, and the following day is allowed to go to his meals with the family. Patients then visit me at my office, and do so without any protection to their eyes.

I ordinarily examine eyes operated on for cataract about the fourth or fifth day if the case is progressing favorably; this being done with as much light as can be let in, and if need be, approach the bed to the window; the patient bearing the light with little or no discomfort. Any oversensitiveness subsides before the examination is completed. When accidents are threatening I make no change unless the patient complains. I then allow the curtains to be drawn sufficiently to moderate the light, but still admit sufficient to make reading possible in any part of the room. Each day when the eye is examined I gradually let in a flood of light while I am soaking off the plaster and cleansing the margins of the lids, by which time the light is borne fairly well and produces no appreciable irritation. It is in such cases that the toleration of an adequate amount of light for the purposes of a careful examination makes us appreciate the great advantages of this rational method. I have always allowed my patients the use of a chamber at the bedside, but it is rarely needed until they are able to sit up. This retention certainly does no harm and is a natural result.

My patients never wear colored glasses, but have colorless correcting lenses adapted at once.

Since the introduction of cocaine, iridectomies for glaucoma or visual purposes and those preliminary to cataract-

extraction have invariably been performed either at my private office or at the public clinics, the patient being allowed to walk home, in most instances to return on the second day; in other words, they are treated as office patients. Previous to the discovery of cocaine, I did the same with clinic cases and private ones not requiring chloroform; these last, for the sake of convenience and saving of time, being operated at their residence. About fifty per cent. of these cases only, have both eyes closed for twenty-four hours and the operated ones forty-eight hours; these are the nervous and unreliable ones and cases in which synechiæ had to be ruptured; the others only have the operated eye closed for twenty-four or forty-eight hours; they are then told to go home and lie down and remain quiet the next day, but not to darken the rooms, and to call at the office or clinic at the expiration of forty-eight hours, when the eye is examined and the plaster left off if it is doing well, which is usually the case. With the exception of those complicated with synechia, none experience the least sensitiveness to light, and even these last need no protection, although they find the light "a little strong." Besides the cocaine, I use no instillations except in cases of synechia, and even in those I have doubted the propriety of such treatment, for the trifling dilatation obtainable after an iridectomy scarcely compensates for the additional irritation produced by the forced muscular action of the injured iris. I have of late, in several iridectomies complicated with synechia, not used atropia, and find my results as satisfactory if not more so than formerly. As a rule, I prefer not to interfere with the healing process by the use of any disturbing instillation, for, beyond the mechanical result obtained, there is no certainty of what the therapeutical effect on the injured eye will be. I prefer to trust to nature's efforts, as they have always been ample and perfect. Injured eyes are invariably treated in rooms with the ordinary illumination found in bedchambers.

Pterygium and squint have always been office operations, except when it was more convenient to do otherwise. All cases of iritis are treated as out-door patients, both my pri-

vate cases and clinical ones going about with or without glasses; I find that they not only bear the light without injury but are thus enabled to take exercise in the open air, which certainly influences the result of the treatment very materially. My success in these cases is truly remarkable.

To most ophthalmologists the above will no doubt seem a hazardous deviation from the respected moss-grown traditions and practices of the past, but after an unprejudiced discussion of the subject and proper trials by competent operators I have no doubt of what the verdict will be.

As I have occasionally been asked for statistics it may occur to others that they should accompany this paper as proofs. Now we all know the little value of statistics and how easily and often they have been invoked to prove the most erroneous doctrines—as an example: I saw Bouilland bleed his typhoid-fever cases at regular intervals and give statistics to prove that his results were superior to that obtained by others. The ability of each as a physician, combined with his skill as an operator, has so much to do with results in ophthalmic practice that statistics are only valuable when they are used as a basis of comparison with the individual experience of each one. As far as I am concerned, I soon saw that for myself I needed no statistics, for I never had any bad results supervene which I could reasonably suspect were even remotely due to this mode of treatment, as can be attested to by hundreds of students, graduates of the Missouri Medical College in the past fifteen years, and also by Drs. F. L. Steuver, and H. L. Wolfner my assistants.

For those who might perhaps object that my facilities of observation may have been too restricted to warrant a conclusive opinion on such an important question, I will state that I have had charge of the large ophthalmic clinic of the Missouri Medical College for fifteen years; of the ophthalmic clinic of the Post-Graduate School of Medicine, now in operation eight months, during which time two hundred and thirty-seven cases have already been treated, with an unusually large proportion of operations; besides these, for many years I have, as Professor of Ophthalmology in the

Missouri Medical College, had charge of a well-filled ward of ophthalmic cases in the St. Louis City Hospital, and was the attendant of ophthalmic cases in half a dozen religious and charitable hospitals of this city, besides having a private practice sufficient to give me abundant opportunities of observation. As to the specific number of cases treated I have never had the time or curiosity to compute the number, and as the results were so uniformly satisfactory from the very first, I have never deemed it worth the time or labor of making out a statistical statement for comparison, but the above facts will show that the field of observation was a large one. Others who may choose to follow my example will probably present statistics for the benefit of doubting ones.

It now remains to show upon what grounds this practice is based, and if they appear as simple and cogent to others as they have seemed to me, no one will refuse at least to give it a fair trial. Let us first discuss the question of the dark room for cataract-operations, which will serve as a test of the method. Here we have mostly old and feeble patients upon whose eyes a delicate and serious operation has been performed, requiring the nicest balance of the recuperative forces to bring them through successfully; they are already depressed by the fear of permanent blindness, yet are condemned by the old method to that utter darkness which they most dread; this of itself must have an injurious influence upon their weakened nervous system very similar to shock. Again, such rooms must of necessity be and actually are badly ventilated, hence unhealthy. Now when daylight has been absolutely excluded for days, the time comes for an examination of the organ; this means light sufficient for the examiner to distinctly see the condition of the iris, anterior chamber, and wound in the cornea, else the examination amounts to nothing and is injurious. To do this properly in ordinary cases we consider it necessary to have clear daylight in the consulting room; but such an amount of light let in upon even a healthy eye under the same circumstances would be both painful and irritating. We all know how disagreeable and trying is the

sudden transition from darkness to light even after a short period of seclusion, as, for instance, in emerging from cellars or caves; how much greater must be the effect of such an exposure on operated eyes? It alone could give rise to inflammatory action. But let us suppose that the case is not doing well—an accident threatens,—then the examination must be more thorough and of longer duration. These examinations are habitually made by the aid of artificial light—the very worst possible form,—for besides being the poorest for diagnostic purposes it is the most irritating to the eye. Truly I have often wondered at the appearance of satisfactoriness of such hurried and imperfect examinations by the dim light of a candle, knowing how little could really be disclosed by them. When surgical interference is indicated in the case, the eye, notwithstanding its long dark-room experience and inflamed condition, must perforce be exposed sufficiently long to strong daylight to enable the operator successfully to interfere. Finally, when the time comes for the patient to emerge from his dark cell, it must be done very carefully, for now daylight has become intolerable and very irritating, so weeks must elapse and colored glasses worn before the bane of the dark-room process is successfully overcome, and the patient allowed to take the much-needed exercise in the open air and derive benefit from the health-giving sunlight.

Daylight is the normal stimulus of the retina and is always more agreeable than artificial light or darkness. Now, in an eye upon which a cataract-operation has been performed, there is no reason why we should look for any degree of sensitiveness to light, especially since it is very materially subdued and modified by passing through the closed lids. Experience has conclusively settled this question to my satisfaction. We all know how easily intense photophobia can be induced by simply permitting patients to exclude daylight too thoroughly, as, for instance in the blepharospasm which attends strumous affections of the cornea in children. I have often seen little sufferers, after a few days of compulsory training, bear with comfort the light of an ordinary bedroom, and shortly after be able to play in the open air

with very little protection. Last month I treated an intensely nervous and somewhat hysterical youth of eighteen, myopic 4 D., who had been confined to a dark room for many months, because of some sensitiveness to light; in less than two weeks by the forcing plan I had the pleasure of seeing him call regularly at my office without any protection to the eye whatever. This unreasonable fear of the injurious effects of daylight on the eye reminds one of the old prejudice against the admission of fresh air into apartments of the sick; patients were shut up in air-tight rooms to protect them from the supposed noxious influence of the very agent which we to-day regard as of the utmost importance for their welfare. Apart from this unfounded fear of the injurious effects of daylight on operated eyes, I have never been able to get from others any reason for the necessity of the dark room, unless it be that "our grandfathers did thus and we have continued to do likewise"; truly a dangerous inheritance which cannot be too soon dispensed with.

Of bandaging, as of the dark room, I will state that in my estimation it is not only superfluous but even injurious. In the first place, if it can be proven that darkness is not desirable in the after-treatment of our cataract-operations, then a bandage which excludes light is objectionable. Bandages, after they have been on a while, especially in warm weather, act as modified poultices, the foul moisture of the secretions and excretions of the part being retained; certainly no surgeon will contend that such a state of affairs is conducive of good results, or that it should not be avoided if possible.

Recent injuries are best treated by the application of the cold-water compress. Viewed from this standpoint the bandage must then again be condemned. But, argues the advocate of the bandage, "it is necessary as a support to the part, to keep the lips of the corneal wound in place," a fallacy which a short investigation of the facts will soon expose. When the corneal tissue is healthy, every ophthalmic surgeon has observed that in the vast majority of cataract-operations, the lips of the corneal wound come together fairly well even before these resecretions of the aqueous, but

after this last has occurred, if the incision has been regular, it is then difficult to locate it exactly, so perfect is the apposition of the parts. If at this stage the eyeball could be left exposed without a covering of any kind, the lips of the wound would certainly remain in position without further efforts to keep them together. But nature has provided a supporting apparatus far superior in every possible respect to the clumsy appliances which human ingenuity has devised. The eyelid moulded in utero to the exact curvature of the underlying organ, lined by a living tissue of exquisite softness, has a firm cartilaginous membrane expressly provided as a reinforcement to give it body and shape; to this is added a muscle which by its arrangement and tonicity is admirably adapted to supply a perfectly regulated, constant, and uniform support to the cornea.

The thickness of this natural splint increased by the addition of the integument seems to make it the most perfect support conceivable. It is hard with these facts before us to understand how any additional support could have been found desirable. But when we examine the superfluous appliances by which it is proposed to obtain the desired end, we are forced to condemn them as mechanically imperfect and destructive of the very object in view. I deny that it is possible to apply a pressure-bandage on the eyelids, without distorting a corneal wound such as is made in the ordinary cataract-operation; a spherical bag of elastic material, filled with fluids and semi-fluids, open at its anterior portion, will not admit of any pressure on it without loss of its original shape. Let us admit, however, for argument, what is very improbable, viz., that the packing is absolutely moulded to the shape of the eyelids and simply in close contact with them throughout; as it is composed of firm substances which retain the shape given them, when the eyeball is rotated from side to side, as must necessarily happen at times, the cornea projecting above the general spherical surface of the larger globe must of necessity meet with the sides of the mould modelled on the larger sphere, and therefore be somewhat flattened out, gaping of the wound being the result.

The bandage, however, would still not serve its purpose even if all these objections were invalidated, for unless applied so tightly that it would do incalculable injury, it soon becomes loose and is no longer a support, while each motion of the patient's head drags and tightens it more or less, producing unequal and injurious pressure on the globe.

An interesting point in connection with this subject is the fact that I have but three times in the last twelve years found it necessary to correct astigmatism after my cataract-operations; these persons very likely had previously corneal astigmatism. Having had so few cases of astigmatism to remedy, I am led to believe that the majority of astigmatic cases following cataract-operations are due to the use of the bandage.

Another powerful argument against the bandage is that the condition of an operated eye without a covering can be with *certainty judged at a glance* by the appearances of the lids. Experience has taught me to tell at once that trouble was brewing by a very slight fullness and flushing of the eyelids, which comes on before the patient complains of any bad symptoms; valuable time is thus gained for the treatment or prevention of complications.

Since writing the above, I was pleased to notice in the report of the proceedings of the Baltimore Academy of Medicine, contained in the *Maryland Medical Journal*, of June 19th, the following:—Dr. J. Chisolm said: "The method had been suggested to him by Dr. Michel, of St. Louis, whom he had seen at the last meeting of the American Medical Association," etc., and that he had "treated eighteen cases (fourteen cataracts and four iridectomies), in this way, and many of them go out from the hospital into direct daylight, without even as much as smoked glasses to protect them, and they complain of no photophobia nor lachrymation. On the sixth day, when the plaster is removed, the eye stands the light better than it did on the tenth day under the old method."

In another article in the *American Journal of Ophthalmology*, for June, Dr. Chisolm reports sixteen cases of cataract-extractions treated by the same method.

He placed his patients in the ordinary lighted wards, with others, and used no bandages. He remarks of them that he had "the most gratifying results, and most of them were brilliant illustrations of the efficacy of this simple treatment." In a letter from Dr. Chisolm to myself, the following occurs: "In every case, now twenty-four cataract-extractions, eight iridectomies, and seven capsulotomies, the patients could stand without pain the full light of the room, with open windows, ten days after the operation, and could go out in the streets at the end of two weeks without smoked glasses, if I would allow them to do so. I found some on the street after dismissal from the hospital at the end of two weeks without smoked glasses. I was so impressed with the rational and physiological aspect of this new dressing that I did not apply it to one case and wait for results, but accepted it with confidence. I returned from St. Louis on Sunday, 9th of May; on the 11th of May I operated upon two cataracts for extraction, one double glaucoma, and one iridectomy, etc. From my observations I am forced to the conviction that most of the photophobia and lachrymation, with painful weakness of the eyes, as seen when the compresses are removed from cataract patients, on the eighth day after cataract extraction, are due to the faulty dressing, and that when light dressings and light rooms are used for cataract patients, weak eyes after operations will not be met with. Of course inflammation may attack such eyes, as is the case with the old dressing, but with the new dressings the percentage will be much smaller, and the comfort of the patient and surgeon inestimable. Since the introduction of cocaine in cataract practice, light dressings in light rooms must come next in importance. I shall never again apply a compress or bandage to cataract-extraction. By this new method my patients are more advanced towards convalescence on the 5th day than the fifteenth day by the old method." In Dr. Chisolm's article I see that he makes use of isinglass plaster, 2½ inches long by 1½ inches wide, spread over the lids from brow to cheek, and carefully adjusted, etc. This I consider unnecessary and inadvisable, for the following reasons: By

this new method the intention is to trust to the tonicity of the eyelids alone to keep the parts well adapted, and if they fail to accomplish this, certainly the plaster will not. But a serious objection to plaster used in this way is, that the lids are attempted to be hermetically sealed, whereas, a free exit for the secretions is necessary, to prevent the painful gushes of pent-up fluids; it is true in some cases they will trickle away by gradually loosening the plaster at the edges of the eyelids; this was an indication, the importance of which I was not slow to seize upon, and have, therefore, substituted a narrow strip ½ inch wide and 1¼ inches long. The size of the strip used by Dr. Chisolm is also objectionable, on account of its being attached to brow and cheek, and is, therefore, of necessity, pulled upon by the play of the facial muscles in conversation, eating, laughing, etc., thus communicating movements to the eyelids, and at times causing pressure on the globe. It is only necessary to prevent the eyelids from opening to any extent, and this is better accomplished by making the plaster only include the lids. When I formerly used large pieces of isinglass plaster, my patients complained greatly of its stiffness and hardness; this has entirely disappeared since the gold-beaters' skin plaster has been substituted, it being much more pliable than the former, and also holds the lids together far more securely. While I, too, allow my patients to walk to their beds after the operation, and attend to calls of nature, I restrain them much more than Dr. Chisolm does. Any effort made may be, and often is, coupled with contraction of the recti muscles of the eye and the orbicularis, during which the globe is certainly disturbed, if not injuriously compressed. I, therefore, do restrict my patients in their movements; they must lie on their backs for about three days, the time necessary for a fair union of the lips of the wound; this is only a moderate privation, and attended with bearable discomfort. After this time I permit them to rest themselves by lying on the side opposite to the operated eye. By the fifth day the corneal wound has generally healed pretty firmly, but I believe it unwise to leave such eyes entirely free, and as it is best to provide against pos-

sible accidents, I apply the strips of plaster so as to leave a moderate opening between the lids of the operated eye, and keep them on until the tenth day.

Even if these reasons against unrestricted movements, and the early removal of plasters were not as cogent as I deem them to be, I would be unwilling to jeopardize the acceptance of this important innovation by hampering it with such an unnecessarily hazardous license to patients.

XEROSIS OF THE CONJUNCTIVA IN INFANTS AND CHILDREN.

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SYNONYMS.—Xerosis epithelialis conjunctivæ, xerosis triangularis, ophthalmia Brazilliana, Hornhautverschwärung bei infantiler encephalitis.

In looking over the literature on this disease I find a number of valuable and interesting papers in foreign journals, but little or no mention of it in English or American literature. Because of this and on account of the comparatively rare occurrence of the disease in the United States, I feel justified in giving a description of a single case and a brief résumé of the existing literature. Dr. H. Knapp kindly examined the following case with me.

Mary T——, five months, of German parents, was brought to the clinic at the Ophthalmic and Aural Institute by her mother on June 19, 1886.

The father and mother are in good health: no history of syphilis or other constitutional disease. Of eight children born, five are living and well. Of the three deceased, the first died at the age of ten months of hydrocephalus; the second of diphtheria at the age of eight years; the third at three months of inanition. The patient was nursed at the breast for two months after birth, at which time feeding from the bottle was substituted. It was at that time fat and well. About the first of June it was noticed that the child kept its eyes closed constantly and that a slight accumulation of mucus was present at the margin of the lids. The discharge increased in quantity, and in consequence the child was brought to the clinic.

St. pr. The little patient was moderately well nourished, appetite good, bowels regular, temperature and pulse normal. The eyes were firmly closed, lids slightly swollen, with a small amount of muco-pus at their margins. The ocular and palpebral conjunctivæ were congested and swollen, lachrymation profuse, corneæ a little dull, pupils small. The child cried when the lids were opened. The case had much the appearance of a simple catarrhal conjunctivitis at this stage. Cold applications to the lids, frequent cleansing of eyes, and an improved diet were ordered.

June 24th. The eyes present about the same appearance as on June 19th, except that the corneæ are a trifle more hazy.

June 29th. The child does not appear so well as when first seen, has lost flesh, is peevish, and does not take its food so readily. The corneæ are anæsthetic and more densely hazy. A grayish infiltration is below and to the inner side of the centre of the pupil. The character of the discharge has changed, it is less in amount, thicker, and of a grayish color. At the bottom of the lower conjunctival sacs a few whitish cheesy flakes are found, and the ocular conjunctivæ below, near the fornix, have became pale. The palpebral conjunctivæ remain congested and slightly swollen. The iris, which is still visible in the left eye, reacts but little to atropine. *Diagnosis:* Xerosis conjunctivæ. *Prognosis:* Lethalis.

July 8th. The child has become markedly emaciated most observable in the extremities, has little appetite, and lies motionless in its mother's arms. On opening the eyes the corneæ are found to be opaque. A perforation of 4 *mm.* in diameter is found in the right cornea at the site of the infiltration above mentioned. A symmetrical ulcer is present on the cornea of the left eye. The ocular conjunctiva, below the horizontal meridian and near the corneæ above, is apparently without blood-vessels and is of a grayish-white color. It has lost its elasticity, is thrown into numerous white folds on movement of the globe, and has a dry, "greasy" appearance. Lying on its surface, but most plentiful near the fornix conjunctivæ, whitish tallow-like flakes are found, which are not affected by the tears, do not wash off readily with water, but are easily removed with dry cotton. Bleeding is not easily produced. The palpebral conjunctiva and the upper portion of the ocular conjunctiva are almost normal in appearance. Lachrymation is much lessened, but is still sufficient to moisten the conjunctival surfaces. A small elevation, due to inflammation

of two or three ducts of Meibomian glands, is present on the right upper lid. I can discover no indication of increased activity of the Meibomian glands as described by Schleich.[1]

July 13th. Emaciation much more marked. The extremities are very thin, abdomen bulged out, pulse frequent and weak, diarrhœa, not profuse. A few mucous râles in the bronchi. The condition of the eyes is very much as on July 8th. Corneal ulcers larger, and the whitish flakes more abundant. The mucous membrane of the gums and hard palate is very pale. No flakes to be seen in the buccal cavity.

July 17th. Emaciation of extremities and body is very marked. The abdomen is distended, liver apparently larger than normal, dulness over base and back of lungs, respiration bronchial with coarse râles, pulse very frequent and weak. The skin of the forehead is dry and of a dull-brown color. On the buccal mucous membrane whitish flakes are noticeable, some deposits of yellowish masses are seen on the fauces. The mucous membrane on the hard palate and on the gums is dry and white. The eyes to-day are wide open for the first time during the course of the disease. The child does not seem to possess the power to close them. The corneæ are dry and opaque. The points of ulceration are about as when last seen. At the margins of the corneæ the conjunctiva has a brownish, dried appearance as in death. The "greasy" appearance of the ocular conjunctiva has changed to one of dryness. The white flakes are still present. A peculiar feature of the case is that the palpebral conjunctiva retains a normal appearance. These observations were made at 2 P.M.; at 7.30 P.M. the child died. Unfortunately I did not succeed in obtaining an autopsy.

At different times during the progress of the case portions of the white masses were examined with the microscope. They were found to be composed of pavement epithelium undergoing fatty degeneration, microbes, cell débris, free fat, fat crystals, and a few pus corpuscles. The fatty degeneration of the cells was very marked; in some the fat globules were small and were arranged concentrically about the nuclei; in others the globules had coalesced. On treating the specimens with ether, the fat disappeared, leaving the appearance of empty spaces in the cells. The free fat was probably the result of the fatty degeneration of

the epithelium. Four varieties of microbes were observed in the conjunctival secretion—cocci in groups, quite numerous; cocci in chains (strepto-cocci); a short thick bacillus, often double (the bacillus described by Leber, Schultz, etc.); and a large bacillus resembling the bacillus subtilis. Pure cultivations of the microbes were made, with the result of obtaining the strepto-coccus, the staphylo-coccus pyogenes aureus, the double bacillus described by Leber, and the common clubbed bacillus. Inoculation experiments on rabbits with the pure culture of the "double bacillus," fifth generation, were made. None were tried with the other varieties.

RABBIT, No. 1.—Inoculated the right eye by piercing the cornea with a Graefe knife which had been dipped in a strong emulsion of the pure culture; also rubbed the emulsion over the wound afterward. In twenty-four hours an opacity in the track of the wound was observed. On the third day a slightly raised opaque patch, six by four *mm.*, was present. On the eighth, the cornea showed scarcely a trace of the opacity. The left cornea was pierced with a clean knife; no reaction.

No. 2.—A young rabbit was treated in the same manner as No. 1. The iris prolapsed, but no reaction of a suppurative nature followed.

No. 3.—The left eye of a young rabbit was inoculated by placing some of a pure culture of the "double bacillus" in the conjunctival sac, and closing the lids by means of fine sutures (Leber's experiment) for two days afterward. Absolutely no reaction. Eye normal.

No. 4.—Like No. 3, with the same result.

I have found the "double bacillus" in the conjunctival secretion where xerosis did not exist. In one a cataract-extraction had been done four weeks previously. In both a mild form of conjunctivitis existed.

In Leber's[2] interesting and instructive paper five cases are reported, the first of which is very full and complete. The patient was a child of four months, anæmic and badly nourished. The case resembles my own in many of its clinical features. Improvement followed appropriate treatment, but a relapse occurred, with extensive sloughing of the

corneæ and the spontaneous escape of the lens from the left eye. The child became very much emaciated, with diarrhœa, and death soon followed. During the last day or two the eyes remained open. The temperature remained normal throughout. No brain symptoms.

Autopsy by Prof. Orth.—Body emaciated. Cortex and medulla of brain vascular, with no marked points of hyperæmia or other pathological appearances. On the mucous membrane of the papillæ and calices of the kidneys numerous brownish-yellow deposits were found. The walls of the calices were thickened. On the surface of the kidneys small hemorrhagic and small white spots were observed, the latter evidently being collections of pus corpuscles. Liver in a condition of fatty degeneration. Small hemorrhagic spots in the mucous membrane of the intestines.

After hardening in Müller's fluid, the eyes were examined. By use of the needle the conjunctival epithelium near the cornea could be stripped off in lamellæ. The cells of the deeper layers were easily separated. Between the epithelial cells numerous pus cells were formed. The surface epithelium was densely covered with microbes, and showed no nuclei. Fat globules, indicating degenerative change, were present in the superficial and deep epithelial cells. These disappeared when treated with ether, leaving the appearance of openings in the cells. No free fat was present. The bacilli are not surrounded by an envelope, nor do they present a fatty appearance when cultivated on gelatine. They stain readily with a watery solution of gentian violet. Measure: 0.0012 to 0.0018 *mm.* in length, and 0.0003 to 0.0004 *mm.* in thickness. The surface of the ulcers showed débris of connective tissue, a very few pus cells, and many bacilli. Many bacilli were found in the interior of the globe. The mucous membrane of the papillæ and calices of the kidneys presented an appearance very like that of the conjunctiva. The epithelial plates were covered with cocci and the "double bacilli." No microbes were found in the deeper tissues. Leber thinks that the coccus is a transition form in the development of the bacillus. He has observed every gradation between the two in supposed

pure-cultures on gelatine and agar. He terms the disease a desquamative hypertrophy of the epithelium, and thinks that it depends on the presence of the bacillus described.

Experiments were made by him as follows:

No. 1.—A rabbit's eye was inoculated by placing a piece of the conjunctival secretion from xerosis in the conjunctival sac, after first having denuded the conjunctiva of its epithelium, in spots. A superficial conjunctival ulcer resulted.

No. 2.—A small amount of a pure culture of the "double bacillus" was placed in the conjunctival sacs in both eyes of a rabbit, and the lids were closed by means of fine cutaneous sutures. Two days afterward the left showed a superficial corneal ulcer, and some cloudiness of the cornea in its vicinity. On the fourth day a superficial ulcer was present in the right cornea, accompanied with a profuse conjunctival discharge.

Leber cites Neisser as having produced a mild, dry, fatty condition of the ocular conjunctiva by inoculating a staphylomatous eye with the "double bacillus." He remarks that xerosis occurs as an accompaniment of intestinal disturbances with vomiting and diarrhœa. The development of the bacillus is governed largely by the condition of the tissues. When their vitality is much reduced, xerosis advances rapidly. The prognosis is most unfavorable in the very young.

Xerosis of the conjunctiva was first mentioned by Rau,[3] in 1841, followed by Bitot,[4] Villemin,[5] and Netter,[6] in 1863, since which time quite a number of papers by foreign observers have appeared.

Dr. Gama Lobo[7] reports four cases of xerosis occurring in slave children, in Brazil, from one to seven years of age. He termed the disease Ophthalmia Brazilliana. All of his patients died. All were anæmic, had been fed insufficiently on a bad quality of food, and had been exposed to inclement weather. The autopsy showed broncho-pneumonia, fatty liver, and gastritis. Dr. Lobo considers the epithelial changes due to atrophy, depending on closure of the blood-vessels and consequent loss of nutrition, and concludes that all die from inanition caused by scant and objectionable food.

A. v. Graefe [9] mentions two cases which he describes as Hornhautverschwärung bei infantiler Encephalitis. The disease occurred in badly nourished infants; both died. On microscopical examination, Prof. Klebs found fatty degeneration of the glioma cells of the medulla and cortex of the brain and fatty degeneration of the liver cells. Graefe met with numerous cases, but few of which had convulsions or any brain symptoms. However, he considered the condition due to encephalitis, constituted by the appearances in the brain.

Virchow [9] examined the brains of an infant that died with xerosis, and found a fatty metamorphosis of the glioma cells, with increased vascularity of portions of the white substance. He is of the opinion that the condition is an active process and not a molecular necrosis due to failure of nutrition; says that the condition does not exist in the brains of all children. Hymen [10] examined the brains of twelve infants who died with xerosis, and found the changes mentioned by Virchow in all. In 1874 Dr. Jastrowitz [11] came forward with the results of the examination of the brains of sixty-five infants dying from many different causes, in which the fatty degeneration of the glioma cells was present in all but one. He argues that the glioma cells are present in excessive numbers at birth, and that the degenerative changes are physiological, causing a disappearance of glioma cells, making room for nerve-fibre bundles which form at this time. Parrot [12] considers the fatty degeneration of glioma cells due to inanition, with heart weakness and hereditary taints as factors. He has produced the same changes in young cats by withholding food. Dr. Bezold [13] mentions a case of xerosis in an infant of one month following measles. Child very anæmic, appetite poor, no brain symptoms during its illness. Fatty degeneration of the glioma cells was found on autopsy. Bezold mentions cocci and bacilli as being present in the conjunctival secretion, but thinks they are there only because the conjunctival surfaces present a soil favorable to their development. Förster [14] is of the opinion that hemeralopia and xerosis are often the results of partaking of one kind of

food, of poor quality, for a great length of time, as with sailors, farm laborers, soldiers, etc. He mentions a case occurring in a child of three years, who was also suffering from diarrhœa and bronchitis. The child recovered with the loss of one eye. Adler has observed xerosis with variola. Fisher with measles. It has also been observed accompanying cholera, typhus, typhoid, and puerperal fevers, etc. Förster considers xerosis in infants to be a forerunner of death due to a low vitality of the tissues, caused by inanition or other disease—a form of cell necrosis. Ferrer [15] believes that inanition, or depression of the vitality by sickness, causes xerosis. Dr. Reymond [16] has met with numerous cases occurring in the inmates of houses of detention for children. All were anæmic, and were suffering from the effects of insufficient exercise and bad food. Many also had diarrhœa. Nearly all complained of night blindness. The retinæ appeared to be less transparent than in the normal eye. More exercise and a change of diet promoted a cure in these cases. Three of the patients were hemeralopic without xerosis. Secretions from the conjunctivæ in Reymond's cases, also from cases observed by himself, were examined with the microscope by P. Colonnatti, who describes cocci and a form of vegetable growth which he considers to be the cause of the formation of the "plaques blanches," and which he regards as oidium albicans. Reymond observes that the cases are most common during the changeable months of spring and fall. Horner [17] does not believe that a bacillus is the primary cause of xerosis conjunctivæ. H. de Gouvêa [18] reports thirty cases occurring in slave children and youths in Brazil. Hemeralopia accompanied nearly all of these cases. The patients were all anæmic, had lived for long periods on insufficient food of poor quality, and were required to do hard labor. He considers the disease dependent on a marasmatic condition of the body due to insufficient food; thinks that the hemeralopia is dependent on anæmia of the retina, and adds as a factor exposure to strong sunlight. He proposes calling the condition xerophthalmia cachectica. Many of his cases recovered under treatment directed to the general

system, and to the eyes, consisting of steam fomentations from water at a temperature of 40° C., continued fifteen minutes each time and repeated three or four times daily. Sattler [19] has found the bacillus mentioned by Leber in the normal conjunctival sac. Schleich has also found this bacillus in conjunctival secretions taken from conjunctivæ where no xerosis existed. Schultz [20] describes a case of xerosis epithelialis conjunctivæ which developed in a spoon-fed, anæmic, emaciated child of twenty weeks. The temperature was elevated during the progress of the disease. Death twenty days after the sickness began. The microscopical examination corresponds very closely with that in Leber's first case. Bacilli were found on the papillæ of the kidneys. The liver was fatty. Jacusiel [21] reports a case of xerosis occurring in a poorly-nourished anæmic child of four months which died without brain symptoms. The changes described by Virchow in the brain were present on autopsy. In the discussion of Jacusiel's paper, Jastrowitz and Friedländer [22] claim to have observed identical changes in the normal brains of infants. Hirschberg [23] observed thirty-two cases of xerosis in 22,500 dispensary patients. All were in infants, and all died. He is inclined to believe that the process is due to the changes in the brain. Schoeler [24] thinks that inanition or depression following acute disease is the cause of xerosis.

By what has preceded we conclude that xerosis epithelialis conjunctivæ occurs only in anæmic, poorly-nourished individuals who have existed for some time on a poor quality of food, or whose vitality has been much reduced by disease. The entire absence of cerebral symptoms, the researches of Jastrowitz and Friedländer, and the fact that in children and adults affected with this disease many recover, renders the supposition of its dependence on encephalitis untenable. The observations and experiments recorded in Leber's paper are not sufficient to demonstrate the parasitic origin of xerosis. The "double bacillus" is not peculiar to xerosis, as it has been observed by others in ordinary conjuntival secretions (Sattler, Schleich, and the author). That the microbe was found on the papillæ of the kidneys

is not, *per se*, evidence that it is the cause of the disease. Degenerating epithelial cells, or the secretion from any mucous surfaces exposed to the air, form a soil favorable to the growth of germs as is proven by the numerous varieties that may be cultivated from such surfaces. The *experiments* made by Leber were incomplete and gave negative rather than positive results. The experiments of Schleich and myself (which were in part a repetition of Leber's) also gave

Description of cut.

1. Free fat globules. 2. Micrococci. 3. Epithelial cells undergoing fatty degeneration. 4. Larger bacilli. 5. "Double bacilli." 6. Pus corpuscles. 7. Fat crystals. 8. Strepto-cocci. 9. Fragment of epithelial cell. 10. Degenerated epithelial cell covered with bacilli.

negative results. We must still hold the opinions of Gamo Lobo, Förster, de Gouvêa, and others of like mind to be correct in regard to the primary cause of this disease. As the prognosis depends entirely on the recuperative powers of the patient and proper treatment can do much to promote a cure, no efforts should be spared to strengthen the patient by improved diet, healthful surroundings, etc. Local treatment, more than to keep the eyes cleansed and washed from time to time with a weak bichloride solu-

tion (1–10,000), is not needful. If the opacities of the corneæ persist, hot fomentations may be employed with benefit.

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[15] *Wien. Med. Presse.*, No. 43 and 45, 1877.
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[19] *Ophthal. Ges.*, Heidelberg, 1883.
[20] *Gräfe's A. f. O.*, Bd. xxx., abt. iv., s. 123.
[21] *Berl. Klin. Woch.*, No. 7, s. 96, 1883.
[22] *Berl. Klin. Woch.*, No. 6, s. 90, 1883.
[23] *Berl. Klin. Woch.*, No. 31, s. 324, 1868.
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SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FOURTH QUARTER OF THE YEAR 1885.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc.

Translated by Dr. F. E. D'Oench, New York.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

565. Fieuzal. Contribution à l'étude de la cécité. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.*, July–Sept., 1885. Fieuzal has prepared an interesting review of the papers competing for the prize for the best essay on blindness, and has added a report of the work of Magnus.

566. Ketteler. Theoretical optics based on the principle of Bessel-Sellmeier, with the experimental proofs. Brunswick, 1885.

567. Layet. Leçons sur les affections oculaires d'origines professionelles. Cour d'hygiène de la faculté de méd. de Paris, 1885. *Rev. sanit. de Bordeaux*, 1885.

568. E. G. Loring. Text-book of ophthalmoscopy, Part I. The normal eye, determination of refraction, diseases of the media,

physiological optics, and theory of the ophthalmoscope. (See review in preceding number.)

569. PEDRAZZOLI. Vademecum per la cura delle malattie oculori piu comuni ad uso degli studenti e medici pratici. Verona, 1885.

570. Prevention of blindness. Sixth annual report, 1885, Notes on some preventable eye-diseases and injuries. A pamphlet intended for the public at large, prepared from a paper by Priestley Smith.

571. v. REUSS. Ophthalmological communications from the second eye-clinic of the University at Vienna. Part I., *Wiener med. Presse*, 1885, Nos. 22–52.

572. WEDL. Pathological anatomy of the eye. With an atlas containing 33 plates. Vienna, 1886. Dr. Bock is engaged upon this excellent publication. All the important pathological changes in the visual organ are illustrated by 196 heliotype figures. A series of diseases in various stages of development forms an important feature. The complete bibliography of the subject is also worthy of note.

v. REUSS (571) has prepared an excellent report on the diseases he observed in the year 1884–85 at the second eye-clinic of the University at Vienna. He discusses the extraction of cataract at length, including all the precautions he has adopted. He also speaks of iridectomy in an exhaustive manner, and reports the results of a long series of experiments setting forth the relations between eserine and cocaine. He has found the following: When eserine or pilocarpine and cocaine are instilled simultaneously, no mydriasis is produced; the beginning and duration of myosis are either not at all or only slightly delayed. When eserine has produced myosis, the latter is not affected by the subsequent instillation of cocaine, no matter whether the quantity of eserine was large or small; pilocarpine acts similarly, but not with the same energy. The maximum cocaine mydriasis rapidly disappears when eserine or pilocarpine is instilled; but the action of the myotics soon ceases when they are given in too small a dose. A more energetic instillation, however, completely overcomes the mydriasis; here, too, eserine is the more reliable. The spasm of the ciliary muscle produced by eserine or pilocarpine is not affected by cocaine, at least not as far as the far point is concerned. The power of eserine and pilocarpine to reduce the tension, particularly in glaucoma, is not influenced

by cocaine; the latter may therefore be used in operations for glaucoma. Sclerotomy was performed only in a few cases of glaucoma, but the results were not in favor of the operation. Binocular is generally slightly better than monocular vision, but the difference is not large enough to be expressed in numbers. Spasm of accommodation is a reflex spasm brought about by the act of fixation; in hypermetropes it takes the form of latent hypermetropia in the interest of distinct vision, or in any kind of refraction may simulate myopia, or increase the latter when actually present; in the latter case it is a pathological condition. It occurs very often, especially in persons who perform much near work, also in scholars. In myopes it may give rise to excessive approximation and increased convergence respectively, and therefore deserves attention. Reuss favors the use of atropine for it. He also reports cases of blepharospasm, recurrent central retinitis, nystagmus accompanied with an apparent movement of objects, unilateral vertical nystagmus, erythropsia.

b.—STATISTICAL PAPERS.

573. AMSTERDAM. Inrichting voor Ooglijders te Amsterdam, May, 1885.

574. BALTIMORE. Eighth annual report of the Presbyterian Eye, Ear, and Throat Charity Hospital, 1885.

575. BOSTON. Sixtieth annual report of the Massachusetts Charitable Eye and Ear Infirmary for the year 1885.

576. HIRSCHBERG. Sixteenth annual report of the ophthalmic Clinic, for 1885.

577. JANY. Twenty-first annual report of the ophthalmic clinic at Breslau, for 1885.

578. JOSTEN. Report of the eye clinic at Münster, for 1885.

579. JUST. Twelfth report on the ophthalmic clinic at Zittau, for the years 1884 and 1885, with an historical review of the first 25 years since the Institute was founded.

580. SCHLEICH. The eyes of the idiots of the home at Schloss Stetten, Wuerttemberg. *Klin. Monatsbl. f. Augenhk.*, Oct. 1885.

In AMSTERDAM (573) 5,678 new patients were treated in the Institute in charge of Drs. Gori, Gunning, Juda, and Rijnberk. 215 operations, among them 34 extractions.

In BALTIMORE (574) 4,291 new patients were treated, 22,335 since the Institution was founded; 99 extractions, 436 in all. The

case of a man is reported who had been blind for twenty-five years and was then successfully operated.

In BOSTON (575) 8,909 cases of eye-disease were treated. 86 extractions according to v. Graefe were performed. The occupation and social status of the patients are also noted. The statistics of 98 extractions are given in detail. Result good in 84 %, moderate in 9 %, loss 7 %; these numbers have reference to only 74 cases operated according to v. Graefe. A preparatory iridectomy was performed in 3 cases. Eight cases were operated according to Wecker; in 8 suction was employed.

HIRSCHBERG (576) treated 7,975 new patients. 79 extractions were performed, with one loss through injury. 104 iridectomies, 18 of them for glaucoma; 84 tenotomies, 47 of them tenotomies combined with advancement; 6 operations with the aid of the magnet, 3 extractions of cysticercus.

JANY (577) treated 3,923 new patients, 68,854 since the Institute was opened. 51 extractions of senile cataract, with only one loss.

JOSTEN (578) treated 2,000 new eye-patients; 313 operations, among them 32 upon the lens; of these, 24 were extractions, 8 divisions. The greatest number of patients were treated in April, May, and June, the smallest in January, September, and December.

JUST (579) treated 3,408 patients in 1884, and 3,502 in 1885. In 1884, 82 uncomplicated senile cataracts were operated, 75 with good, 4 with moderate result, 3 failures. In 1885, 78 senile cataracts were operated, 74 with good, 2 with moderate result, 2 failures. Suppuration of the wound occurred after extraction only once in two years.

SCHLEICH (580) found among 165 idiots anomalies of the muscles in 10 %; in 10 cases concomitant strabismus, in 6 cases convergent, and in 4 divergent; of the latter, 1 was myopic, 3 hypermetropic. Nystagmus in 5 cases; of these, 2 presented no marked anomalies, in the remainder he found in one case a large leucoma in both eyes, in another a persistent hyaloid artery and in a third microcephalus with coloboma of the optic nerve. In 5 % the cornea was cloudy. The lens was normal in all cases. In 11 cases a persistent pupillary membrane was found and posterior synechiæ were a common occurrence; in 2 cases there was a marked difference in the size of the pupils; in 5 the reaction to light was slow, but in some of them prompt to an accommodative effort; in

one case myosis. Among 299 eyes only 17 = 5.7 % were myopic, 62 = 20.7 % emmetropic or slightly hyperopic; the remainder were hyperopic in a higher degree. Only 3 cases of uncomplicated myopia were found. Accumulations of pigment in the fundus and colobomata were observed in 8 cases. In a case of hydrocephalus atrophy of the optic nerve was noted coupled with thinning of the arteries and thickening of the veins. In two cases of atrophy of the optic nerve vision was almost normal. No cases of retinitis pigmentosa were observed. Central disturbances of vision occurred in only a few cases; 87 % of the total number had normal vision. None were color-blind. No defects of the field of vision could be discovered where sight was normal.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY AND DIAGNOSIS.

581. CHIBRET. De l'infection de l'œil, ses causes, son traitement. *Arch. d'ophth.*, 1885, No. 3.

582. GALLENGA. Dell idroftalmia congenita. Studio clinico ed istologico. *Ann. di ottalm.*, vol. xiv., 4.

583. HOCH. The parasitic theory of disease in ophthalmology. *Correspondenzbl. f. Schweizer Aerzte*, 1885, No. 23.

CHIBRET (581) thinks that the possibility of infection depends to a great extent upon the conditions of the soil, and that the latter is a particularly good one after extractions: the microbes flourish on the remnants of lens matter mixed with the aqueous. The purulent secretions of the lachrymal ducts and passages of respiration are the most prolific sources of infection. When a corneal wound has become infected, sublimate 1: 2,000 is used.

b.—GENERAL THERAPEUTICS.

584. ALBINI. Exenteratio bulbi. *Gaz. degli ospitali*, 1885, Nos. 80–82.

584. GALEZOWSKI. Emploi des rondelles de gélatine pour l'occlusion de la plaie cornéenne après l'extraction de la cataracte. *Rec. d'ophth.*, vol. vii., p. 10.

586. HIRSCHBERG. Antiseptics in ophthalmology. *Berl. klin. Wochenschr.*, 1885, No. 42.

587. LANDOLT. Du maniement des instruments en ophthalmologie. *Gaz. des hôp.*, 1885.

588. WICHERKIEWICZ. A new method of operating unripe cataracts, with a contribution to antiseptics in ophthalmology. *Klin. Monatsbl. f. Augenhk.*, 1885, p. 478.

GALEZOWSKI (585) believes that normal tears contain bacilli which penetrate into the wound during an operation and produce infection. Antiseptics act in operations upon the eye only while they are in contact with the wound; when the lids are closed their action ceases. According to Galezowski it is therefore important to protect the wound against contact with the tears, which is accomplished by placing strips of gelatine half a *mm.* thick upon the wound. In order that the eye may not be irritated, the gelatine is saturated with a solution of cocaine and sublimate and the surface toward the cornea gummed. A strip of gelatine 1½ *cm.* square is used; the corners are cut off, and little incisions are made into one side. It is placed in hot water before it is applied. The side which was not incised is placed under the upper lid, the incised side under the edge of the lower lid, and then the eye is closed. The gelatine completely dissolves in the tears. This bandage has been applied in nineteen cases, in all of them with good result; Galezowski calls attention particularly to a case of old dacryocystoblennorrhœa, which could not be treated, and in which extraction was successfully performed.

In cases of unripe cataract WICHERKIEWICZ (588) advises to wash out the remnants of cortex with an apparatus which he has constructed. He recommends this method for traumatic cataracts also and has tried it. The Reviewer observes that the method of washing out the anterior chamber after extractions seems to have been much in vogue in former times.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

589. BECKER. The circle-eye, an easily constructed section of the eye for purposes of instruction. *Bericht über d. XVII. Versamml. d. ophth. Gesellsch.* Heidelberg, 1885. Rostock, 1885.

590. BURNETT. The electric-light ophthalmoscope. *Trans. Amer. Ophth. Soc.*, 1885.

591. DENNETT. A Stokes lens for measuring astigmatism.—Test-types. *Trans. Amer. Ophth. Soc.*, 1885.

592. EMERSON. A schematic eye for students of ophthalmo-

scopy. *Med. Rec.*, Oct. 10, 1885. By the introduction of a lens and illustrations of the fundus it can be used for every purpose.

593. HEYL, A. G. A new discission instrument. *Amer. Journ. Med. Sci.*, August 6, 1885. The needle, the edge of which is bent at an angle of 15°, is 11 *mm.* long and 5 *mm.* broad.

594. HOWE, L. A protective shield for the eye. *Med. Press of Western N. Y.*, Nov., 1885.

595. JACKSON, E. A new form of refraction ophthalmoscope. *Trans. Amer. Ophth. Soc.*, 1885.

596. LAZERAT. Description d'un nouveau tonomètre oculaire. *Rec. d'ophth.*, Oct., 1885.

597. OLIVER. A new series of metric test letters for determining the acuteness of direct vision for form. *Trans. Amer. Ophth. Soc.*, 1885.

598. PRIESTLEY SMITH. Movements of the eyes. *Ophth. Soc. Unit Kingd.* Simple apparatus for demonstrating the conjugate movements of the eyes.

599. PRIESTLEY SMITH. Operations on the eye. *Ophth. Soc. Unit. Kingd.* Apparatus for demonstrating operations upon the eye before a class.

600. PRIESTLEY SMITH. Perimetric records. *Ophth. Rev.*, 1885, No. 47. Smith describes a simpler method of representing the boundaries of the field of vision. For instance the normal visual field of the left eye would be represented as follows :

55	70 55 55			8 7 8
55 L 90	or 90 L 55	Central scotoma :		18 L 8
65	80 65 58			10 7 8

601. Test-types and tables according to the metric system for examining sight. Published by the St. Petersburg Ophthalmic Institute, 1885.

602. SCHJÖTZ. A self-registering perimeter. *Arch. f. Augenhk.*, vol. xvi., 1.

b.—REMEDIES.

603. FLEISCHER. The changes which various mercurial salts undergo in the body. *Deutsche med. Wochenschr.*, 1885, No. 36.

604. VACHER. Du bijodure de mercure combiné à l'iodure de potassium comme pansement antiseptique en chirurgie, et particulièrement en chirurgie oculaire. *Gaz. hebd. de med. et de chir.*, 1885, No. 36.

FLEISCHER (603) arrived at the following results: In presence of Na Cl calomel is dissolved in small quantities and is converted into sublimate, while Hg is set free. The formation of sublimate is favored by a higher temperature (that of the body). The quantity of sublimate formed is very small, but clearly traceable.

IV.—ANATOMY.

a.—CONJUNCTIVA, CORNEA, AND MUSCLES.

605. HERZENSTEIN. On measuring the conjunctival sac (synchesmometria). *Wjestnik ophth.*, Nov., Dec., 1885.

606. JAVAL. Mensuration de la cornée. *Gaz. des hôp.*, 1885, p. 1011.

607. MOTAIS. Recherches sur l'anatomie humaine et l'anatomie comparée de l'appareil moteur de l'œil. *Arch. d'ophth.*, Nov., Dec., 1885.

HERZENSTEIN (605) has undertaken a series of measurements in one hundred healthy persons, of the depth of the upper and lower conjunctival sacs, from the edge of the lid to the fornix, which, according to his knowledge have not been performed before. For this purpose he used a thin plate of ivory with rounded edges, with a scale marked upon it and an index movable along the latter. He found that the average depth of the upper sac is 22 to 24‴, and that it varies between 18 and 28‴; that of the lower is 11 to 12‴, one half of the upper, and it varies between 9 and 14‴. Both eyes are not always alike in this respect. The greatest depth is found in myopes, the least in hypermetropes.

MOTAIS (607) concludes his paper on Tenon's capsule, published in the preceding number of the *Arch. d'ophth.* He discusses at length the prolongation of the fascias of the muscles, "ailerons ligamenteux," and describes and illustrates their arrangement, as well as the fascias uniting and enveloping the various muscles, and the part they take in forming Tenon's capsule. v. MITTELSTÄDT.

b.—UVEAL TRACT.

608. ANCKE. Three cases of congenital ectropium of the uvea. *Centralbl. f. prakt. Augenhk.*, Oct., 1885.

609. BERTILLON. La couleur de l'iris. *Rev. Sci.*, 1885, No. 3.

610. FUCHS. The anatomy of the iris. *Klin. Monatsbl. f. Augenhk.*, 1885, p. 467.

611. FUCHS. Contribution to the normal anatomy of the human iris. *Arch. f. Ophth.*, vol. xxxi., 3.

612. MANZ. On pseudo-coloboma of the iris. *Tageblatt d. 58. Versamml. deutscher Naturforscher u. Aerzte in Strassburg*, p. 498.

613. VIRCHOW, H. The ciliary muscle of the frog. The different forms of the ligamentum pectinatum iridis. *Arch. f. Anat. u. Physiol. Anat. Abth.*, 1885, p. 571.

ANCKE (608) describes three cases in which there was a large number of roundish nodules with a dark-brown, velvety surface at the edge of the pupil. In horses and cattle excrescences of this kind occur so often that they may be considered normal.

FUCHS (610 and 611) has studied the details of the surface of the iris in particular. We shall mention only a few important points, and for the remainder would refer to the paper itself. In the iris there is a system of larger clefts surrounding the blood-vessels of the middle layer; Fuchs calls it the iris cleft. This cleft communicates on the one side with the lymph-spaces of the ligamentum pectinatum, on the other with the anterior chamber through its pupillary and ciliary openings (crypta and openings of the marginal zone). There is no arrangement in the human iris to which may be ascribed the power of dilating the pupil except the limiting lamella, and the latter differs materially from muscle-tissue in its anatomical properties. When the pupil contracts, the following changes take place: the iris becomes broader but thinner; all its tissues are stretched in a radiating direction, thus contracting the pupillary openings of the lymphatic cleft and dilating the ciliary openings. When the pupil enlarges, the iris becomes narrower and thicker, its tissue relaxes, the pupillary openings of the lymphatic cleft enlarge, while the ciliary ones contract.

V.—PHYSIOLOGY.

a.—IRIS.

614. BELLARMINOFF. Application of the graphic method to investigations of the movements of the pupil. *Arch. f. d. ges. Physiol.*, vol. xxxvii., p. 207.

b.—RETINA.

615. FINKELSTEIN. On changes in the visual field and color perception in some affections of the nervous system. *St. Petersburger psychiatr. Gesellsch.*, Oct., 1885.

616. GRADENIGO. Intorno all'azione della luce e del colore della retina della rana. *Gaz. d'ospit.*, vol. vi., pp. 73, 74.

617. HILBERT. On the physiology of the retina. *Arch. f. Physiol.*, vol. xxxvii., p. 123.

618. LEEGAARD. Om elektro-diagnostik Synsfelt undersögelse. *Norsk. mag. f. Lagevid.*, vol. xv., No. 12, p. 803.

FINKELSTEIN (615) has found that in healthy women there is a perceptible contraction of the visual field of both eyes during menstruation.

LEEGAARD (618) has made measurements of the visual field for the purpose of testing the assertion of Dr. Engelskjön. The latter declares that the faradic and galvanic currents exert an opposite influence on the limits of the field of vision, and that this influence can be utilized for diagnostic purposes and as a remedy, the current which enlarges the visual field acting beneficially on the disease in question. The author examined sixteen persons. In every eye the limit of the field of vision was recorded according to Dr. Engelskjön's method at short intervals. The fluctuations were about the same, no matter what current was used, and the author concludes, therefore, that the method is of no value for diagnostic purposes. SCHJÖTZ.

c.—COLOR-PERCEPTION.

619. EINTHOVEN. Stereoscopy by difference in color. *Arch. f. Ophth.*, vol. xxxi., 3.

620. HOLMGREN. Om färgsinnet hos främmande folk, redogörelse för Dr. Karl Rudberg's undersökningar under Fregatten Vanadis verdelsomsegling. Upsala, *Läkareförenings Förhandlingar*, vol. xxi., 2.

HOLMGREN (620) found that the Chinese and Japanse are colorblind in the same manner and to the same extent as the Europeans. Holmgren's test is quite sufficient for examining even nations whose language the examiner does not understand.

Sections VI.–XI. reviewed by Dr. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

621. Burnett, S. M. The action of cylindrical glasses in the correction of regular astigmatism. *Amer. Journ. Ophth.*, 1885, No. 12.

622. Cornwall, F. Why astigmatism of low degree should be fitted with different lenses for the near-point and for distant vision. *Amer. Journ. Ophth.*, 1885, No. 10, p. 219.

623. Culbertson, H. On the application of cylindrical glasses in spasmodic myopic astigmatism. *Amer. Journ. Ophth.*, 1885, No. 8, p. 181, and No. 10, p. 211.

624. Eales. Paralysis of accommodation. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 300.

625. Fitzgerald. Acute spasm of accommodation. *Ibid.* p. 311.

626. Jasinski. On the connection between anomalies of refraction and curvature of the spine. *Gaz. lekarska*, 1885, Oct. 3d and 17th.

627. Paci. Abbozzo di ricerche intente a segnalare ed a interpretare il difetto di coincidenza tra lo sperimento ed i principi di ottica fisiologica intorno alle variazioni del valore di R. consecutive alla evacuzione dell' acqueo dalla camera anteriore. *Riv. Clin.*, vol. xxiv., 9, Sept., 1885.

Risley, S. D. Three additional cases of hypermetropic refraction passing, while under observation, into myopia. *Trans. Amer. Ophth. Soc.*, 1885, p. 102.

629. Theobald, S. Notes on three cases of progressive astigmatism. *Trans. Amer. Ophth. Soc.*, 1885.

630. Weiss, L. The length and curvature of the orbital portion of the optic nerve, and its influence on the development of myopia. *Tageblatt d. Naturforsch.-Versamml. zu Strassburg* 1885, p. 498.

Eales (624) reports a case of complete paralysis of accommodation and convergence occurring in a girl aged 13, who presented no other evidence of disease. It was probably due to a degenerative process in the special part of the nucleus of the third nerve.

Fitzgerald.

Fitzgerald (625) reports two cases of acute spasm of ac-

commodation, and alludes to the small number that have been recorded.

JASINSKI (626) found that in 37 cases of scoliosis the disease was undoubtedly preceded by various irregularities of the eyes (insufficiency of the interni, astigmatism). Myopia alone seems to have no effect on the development of scoliosis; anisometropia and insufficiency, on the contrary, most frequently; also spasm of the accommodation. Exercise or amelioration of the ocular affection is claimed to be of material benefit in the treatment of scoliosis. HIRSCHMANN.

PACI (627) repeated on two patients the experiments of Reymond, Albertotti, and Tartuferi, in regard to the refraction after abolition of the anterior chamber, and found a mean increase of 2.9 D (in the first case, a hyperopic eye, the difference was 2.75 D; in the second, a highly myopic eye, 4 D). The author thinks that, in accordance with a calculation based upon the schematic eye, the increase of refraction due to the advance of the lens after the escape of the aqueous, should be still greater, but that probably the cornea, and possibly also the lens, become less convex, thus bringing about a diminution. The numerical value of the diminution of refraction is determined by the different degree of elasticity of the cornea, iris, lens, and zonula, by the more or less complete discharge of the aqueous humor, by the instillation or absence of atropine, by the intra-ocular pressure, etc., and is therefore very variable; the values obtained by the authors named above, therefore differ materially. DANTONE.

RISLEY (628) saw hyperopic change to myopic astigmatism in the course of a year in a girl aged 20. A similar change took place in another girl aged 16, but required four years; and in still another case, a girl of 16, two years were required. In all three cases there were choroidal changes in the region of the posterior pole.

THEOBALD (629) reports three cases in which the degree of astigmatism increased in the course of a few years. The author believes that the corneal astigmatism was partially corrected by that of the lens, and that, as the breadth of accommodation was diminished, the corneal astigmatism again manifested itself.

BURNETT.

WEISS (630) has examined the orbital portion in the optic nerve in about sixty cases. Its length varied considerably, the maximum being 30 *mm.*, the minimum 20 *mm.* The curvature was

sometimes marked, sometimes very slight, and often different in both eyes. The greatest distance from the optic canal to the entrance into the globe was 24 *mm.*; the minimum 14 *mm.* There was either only a slight strain on the nerve, or none at all, when the latter was long, even in extensive movements, but was quite marked when the nerve was short and straight. In the latter case, the papilla appeared oval and changed, just as we see it in eyes the refraction of which is being increased by lengthening of the axis. Weiss therefore asserts that the relative or absolute shortness of the optic nerve has a material influence on the development of myopia.

VII.—LIDS.

631. ACKLAND, J. L. A case of ectropion. *Brit. Med. Journ.*, Aug. 8, 1885.

632. ANDRIEUX. Oedème primitif ou essentiel des paupières et d'une partie de la face. *Journ. de méd. et de chir. prat.*, 1885.

633. LANDOLT, E. De quelques opérations pratiquées sur les paupières. *Arch. d'Ophth.*, 1885, No. 6, p. 481.

634. MACHARDY. Obstinate case of ectropion successfully treated by the Argyle-Robertson operation. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 45.

635. MACHARDY. Fat developed in both upper eyelids. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 44.

636. POST, M. H. A case of transplantation of two skin-flaps without pedicle. *Amer. Journ. Ophth.*, 1885, No. 10, p. 215.

637. SNELL, S. Congenital defects. *Ibid.*, vol. iv. p. 333.

638. ZIEM. Blepharospasm after syringing out the ear. *Deutsche med. Wochenschr.*, 1885, No. 49.

ACKLAND (631) reports a case of slight ectropion which recovered spontaneously after extraction of an upper eye-tooth.

MAXWELL.

ANDRIEUX (632) describes a singular case of œdema of the lids which developed every month in a girl, and lasted from two to four days. MARCKWORT.

In cases of ectropium of the lower lid, with marked thickening of the margin, LANDOLT (633) excises a wedge-shaped piece from its whole length, and then applies Snellen's suture from the skin, uniting the wound at the same time. In operating for distichiasis

according to Jaesche-Arlt, Landolt excises a nearly rectangular instead of a flat semilunar piece of skin, so that the portions of the lids adjacent to the commissures can be pushed up to a sufficient degree. If a greater effect is desired, sutures similar to those of Snellen are passed subcutaneously from the upper edge of the flap beneath the eyebrows, and there tied upon a support. When the skin is lax and poorly nourished, nothing of it is excised, and the flap, after being made movable, is raised by forming a fold of skin parallel to the edge of the lid, by means of sutures. In performing blepharoplasty, Landolt splits the lids into a cutaneous and tarsal portion, and then moves the former in a horizontal or vertical direction. In one case, in which the inner third of the upper lid had to be sacrificed on account of a neoplasm, the remainder of the lid was split into two parts, and the defect covered with the flap of the skin of the lid. In another case a bridge of skin of the upper lid, parallel to the edge, was united with the freshened remnant of the lower lid, the lateral connections being severed afterwards. In a third case a flap from the lid was displaced and another from the forehead inserted in its place. Still another case, which presented great operative difficulties, has been previously reported (*Arch. d'ophth.*, vol. i., No. 2, p. 111, 1881). The functional and cosmetic result was very satisfactory in every case. For particulars see the original, the illustrations in which give a much better idea than a brief review.

v. MITTELSTÄDT.

MACHARDY (634) successfully operated a case of ectropium of the upper lid, resulting from chronic conjunctivitis, according to Argyle-Robertson's method, after all others had failed.

MACHARDY (635) observed in an otherwise healthy servant girl of sixteen, a peculiar thickening of the upper lid, which greatly resembled œdema, but was not painful. He excised an elliptical flap of skin and a portion of the fatty tissue underneath. The cosmetic result was satisfactory. The formation of fat began at the age of ten, and had increased with advancing age.

In POST'S (636) case, both upper lids were defective, through removal of a large amount of skin for trichiasis. Flaps without a pedicle were inserted and healed in well, only one of them sloughing partly.

SNELL (637) reports cases of congenital cysts in the lower eyelids, with apparent anophthalmus, and a case of congenital orbital cyst, with microphthalmus.

FITZGERALD.

VIII.—LACHRYMAL APPARATUS.

639. ALT, A. A case of spindle-cell sarcoma of the lachrymal gland. *Amer. Jour. Ophth.*, 1885, No. 9, p. 201.

640. ARMAIGNAC. Intorno alla dilatazione ed irrigazione delle vie lacrimali nella terapeutica delle malattie di questi condotti. *Boll. d'ocul.*, vol. viii., 2.

641. MORTON. Congenital unilateral absence of lachrymation. *Trans. Ophth. Soc. Unit. Kingd.*, vol. iv., p. 350.

ALT's (639) patient was a man forty-six years of age, in whom, after a febrile attack, diplopia developed, accompanied with ptosis and paralysis of the left internal rectus. Six months later, the left eye was protruded straight forward from the orbit, and was covered by the lid, which could not be raised. The eyeball was fixed, the pupil dilated ad maximum, the optic nerve atrophied. This condition was due to a tumor of the lachrymal gland. It was removed, together with the globe, and proved to be a spindle-celled sarcoma. BURNETT.

ARMAIGNAC (640) recommends medicamentous treatment of the lachrymal passages, and describes a probe for dilating strictures, and an irrigating apparatus, which can be used without splitting the canaliculus. DANTONE.

MORTON (641) saw absence of lachrymation in the right eye of a boy six years of age. The development of the entire right side of the face seemed to have been arrested. FITZGERALD.

IX.—MUSCLES AND NERVES.

642. CRITCHETT and JULER. Strabismus and slight paralysis of right external rectus. *Trans. Ophth. Soc. Unit. Kingd.*, vol. iv., p. 332.

643. HIRSCHBERG, J. On measuring the degree of Strabismus and dosing the extent of the operation. *Centrabl. f. prakt. Augenhk.*, 1885, p. 325 (to be continued).

644. HOLT, E. E. Strabismus ; its correction when excessive, and in high degrees of amblyopia. *Trans. Amer. Ophth. Soc.*, 1885.

645. TOUPET. Des perfectionnements de l'opération du strabisme. *Gaz méd.*, 1885, No. 34.

CRITCHETT and JULER (642) saw convergent strabismus develop four days after a severe scalp wound. As there was H equal to 5 D in each eye, they considered the strabismus chiefly to be due

to the H. The internal rectus of each eye was divided with satisfactory results. FITZGERALD.

HIRSCHBERG (643) reports two cases of convergent strabismus in which he detached the internal and advanced the external rectus with good result.

HOLT (644) has made an advancement of one of the recti muscles, in conjunction with tenotomy of the opposing muscles, in twenty-five cases, in twenty of which the result was successful as regards parallelism and binocular fixation. BURNETT.

646. BÈGUE. Parlysie des deux sixièmes paires et paralysie des muscles, consécutive à une angine diphthéritique. Guérison par le traitement tonique. *Bull. de la clin. nat. ophth.*, 1885, p. 193.

647. BÈGUE. Paralysie de la quatrième et de la sixième paire ; paralysie de la branche maxillaire supérieure du trijumeau d'origine syphilitique. *Ibid.*, p. 195.

648. BRAILEY, W. Uniocular diplopia. *Trans. Ophth. Soc. Unit. Kingd.*, vol. iv., p. 298.

649. FROST. Case of conjugate deviation of the eyes, down and to the right. *Ibid.*, vol. v., p. 197. Report of case.

650. GOWERS. Spasm of the ocular muscles. *Ibid.*, vol. iv., p. 306.

651. GUNN and ANDERSON. Uniocular diplopia. *Ibid.*, vol. iv., p. 292.

652. HARLAN, G. C. Congenital paresis of both external recti muscles. *Trans. Amer. Ophth. Soc.*, 1885.

653. ORMEROD. Paresis of superior rectus. *Trans. Ophth. Soc. Unit. Kingd.*, vol. iv., p. 310.

654. SHARKEY, L. Partial ophthalmoplegia interna and externa. *The Lancet*, 1885, vol. ii., p. 22.

655. SMITH, PRIESTLEY. Transient astigmatism due to paralysis of ocular muscles. *Ophth. Rev.*, 1885, p. 354.

656. SNELL. Miners' nystagmus. *Trans. Ophth. Soc. Unit. Kingd.*, vol. iv., p, 315.

657. TILLEY, R. Congenital complete paralysis of the oculomotors, the movements of the irides and the accommodation being intact. *Amer. Journ. Ophth.*, 1885, No. 9, p. 195. Report of a case.

658. WEBER, L. Ophthalmoplegia externa. *N. Y. Med. Journ.*, Dec. 5, 1885.

Brailey (648), Gunn, and Anderson (651), report cases of uniocular diplopia associated with paralysis of the external rectus. Under treatment the diplopia also disappeared.

Fitzgerald.

Gowers (650) calls attention to three forms of spasm of the ocular muscles, viz.: spasm of the ocular muscles in chorea; partial convulsion affecting a single ocular muscle and a singular case of convulsive nystagmus. In chorea it appears that the spasm may be so unequal in the two eyes as to cause brief diplopia. This was so marked in one case that, taken in conjunction with other symptoms, Gowers was at one time inclined to think that he had to deal with a case of organic brain-disease. The patient, however, made a good recovery, but subsequently had a second attack of very characteristic chorea, thus confirming the diagnosis. Her sister also consulted Gowers for distinct choreic movements. From inquiries he has since found that diplopia, as an accompaniment of chorea is not at all infrequent. He reports two cases of convulsive movements outwards of the left eye, and a case of convulsive nystagmus occurring in a case of advanced Bright's disease. Fitzgerald.

Harlan (652) reports a case of congenital paresis of both external recti muscles in mother and daughter; no other pareses were present. Burnett.

Ormerod (653) reports a case of paresis of the superior rectus which was attended with other nervous symptoms.

Fitzgerald.

Snell (656) believes that miners' nystagmus depends for its causation on the position the miner assumes whilst at work. So far as his observations go it is only those who are engaged in what is termed "holing," that is driving a cutting underneath the seam, who are affected with nystagmus. "Holing" necessitates the worker lying either on his right or left side and keeping the eyes in an oblique and upward position. The muscles of the eye are employed in keeping the globe in an unusual position for many hours together. There is thus prolonged strain, chronic fatigue results, and, atony of the muscles being induced, oscillation of the globes is caused. Fitzgerald.

Priestley Smith (655) observed total paralysis of the internal and external rectus muscle of the right eye, in a lady aged thirty, after a cold. The other muscles were not affected, so that only the horizontal movements of the eye were absent. The patient

noticed, in addition to double vision, that sight in the right eye had become worse. The cause of this was found in slight myopic astigmatism in the vertical meridian, which was corrected with a cylindrical glass of 1 D, axis horizontal. The paralysis and astigmatism both disappeared under treatment with salicylate of sodium and iodide of potash.

In WEBER'S (658) case there was paralysis of all the external muscles of the eyes, that of the externi being complete; the iris and ciliary muscle, as well as the levatores were unaffected. The right hand was colder than the left. The sense of touch was diminished as well as the actual muscular power. The gait was unsteady. Weber was inclined to locate the lesion in the left half of the pons, and considered it a neoplasm either syphilitic or tubercular. The patient was treated with iodide of potass., of which he finally took 45 grains three times a day. In the course of four months great improvement was manifest, only a slight paresis of the externi remaining. BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

659. BORTHEN, LYDER. Observations on empyema of the frontal sinus. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 241.

660. CHARCOT. Maladie de Basedow, formes frustes, nouveau signe physique, traitemente par l'electricité. *Gaz. des hôp.*, 1885, p. 98.

661. CRITCHETT, A. Orbital cellulitis. *The Lancet*, 1885, vol. ii., No. 17.

662. DUJARDIN. Un cas de méningocèle. *Jour. des sci. méd. de Lille*, 1885, No. 6, p. 177.

663. HARTMANN. Abscès de l'orbite consécutif à un coryza aigu. *Ann. des mal. de l'oreille et du larynx*, 1885, p. 45.

664. PANAS. Quelques considérations sur la pathogénie du goître exophthalmique. *Union Méd.*, 1885, No. 105.

665. PEUNOW. Orbital cysts. *Wjestnik ophth.*, 1885, No. 6 p. 411.

666. WHERRY. Orbital tumor. *Brit. Med. Journ.*, Jan. 17, 1885.

In connection with a description of three cases of empyema of the frontal sinus, LYDER BORTHEN (659) remarks that exophthalmus need not be present in all cases. Perforation may take place at the anterior wall of the frontal sinus or through the

ethmoid bone, in rare cases only, into the cranial cavity. The disease may be due to injuries, syphilis, arthritis, and coryza. The treatment consists in incision and evacuation of the contents of the cyst.

According to CHARCOT (660) the electric resistance is very slight in patients affected with morbus Basedowii.

MARCKWORT.

CRITCHETT (661) reports a case of orbital cellulitis in a girl aged fifteen. He found proptosis with marked chemosis, accompanied with orbital and frontal pain. The pupil responded slowly, and the refractive media were so dull, that the fundus could not be seen. An incision was made through the upper lid into the orbit, and a large quantity of sero-sanguinolent liquid escaped, but no pus. No trace of a tumor was found. The pain ceased, but the proptosis remained. Ten days later the sight of the left eye began to be affected, while that of the right improved. Thirty-six hours later sight in the left was fully restored once more, while in the right it was again affected. The proptosis also increased. Another incision was made, but only serous liquid escaped. Her condition improved steadily, but after a few weeks the peculiar visual disturbances were noticed again, though at present they have once more disappeared. The girl had bad teeth, and her condition improved every time a tooth was extracted.

DUJARDÌN (662) demonstrated a case of meningocele before the Soc. des sci. méd. de Lille. The tumor was situated over the inner portion of the left eyebrow; was the size of a hazel-nut, and disappeared on pressure. MARCKWORT.

HARTMANN (663) describes a case of orbital abscess due to acute coryza. Recovery. MARCKWORT.

PEUNOW (665) reports the case of a patient aged twenty-eight, whose left eye was normal and general health good. Marked asymmetry of the face: the right side doubly as wide as the left. The lids are pushed apart by a large, hard, slightly movable orbital tumor, covered with conjunctiva. The eyeball is situated on the anterior surface of the tumor, and is flattened in its antero-posterior diameter to a mere disc; it can be raised with a forceps and moved. The first subjective symptoms were observed seventeen years ago. Five or six years later there was marked exophthalmus and total blindness of the right eye. The tumor when removed was the size of a goose-egg, and proved to be a cyst with

thick walls and divided into many compartments. It contained a yellowish-red liquid with only fat-cells, blood-corpuscles, and cholesterine crystals in it. Peunow thinks that the cyst developed from the sheath of the optic nerve. HIRSCHMANN.

WHERRY (666) records a case of orbital tumor in a man aged fifty-three years, who had been previously emmetropic, and was now in the affected eye myopic (— 3 D). There was also slight optic neuritis. MAXWELL.

XI.—CONJUNCTIVA, CORNEA, SCLEROTIC, ANTERIOR CHAMBER.

667. ALT, A. On the inspersion of powdered jequirity in cases of trachoma. *Am. Jour. Ophth.*, Nov., 1885, p. 257.

668. BAUDON. Chancre de la conjonctive. *Rec. d'ophth.*, 1885, No. 11, p. 672.

669. BENSON, A. Primary lupus of the conjunctiva. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 41.

670. BOUNTAH. Traitement de l'ophthalmie granuleuse par le jequirity. *Rec. d'ophth.*, 1885, No. 11, p. 689.

671. CASPODI. Conjunctivitis diphtheritica. *Wiener med. Wochensch.*, 1885, No. 49.

672. CECCHÌNI. Nuovo metodo di cura chirurgica delle granulazioni congiuntivali. *Gaz. d'ospit.*, vol. vi., p. 100.

673. GLORIEUX. L'idiosyncrasie de la conjonctivite atropinique. *Ann. d'ocul.*, vol. xciv., p. 201.

674. GRATSCH, N. S. The question of obligatory prophylaxis in blenorrhœa neonatorum. *Rusk. med.*, 1885, No. 48.

675. GUAITA. Epitelioma della congiuntiva bulbare. *Gaz. d' ospit.*, vol. vi., p. 77. Report of a case.

676. HJORT, J. Den kroniske conjunktival hyperæmi og den kroniske follikulare konjunktivalbestændelse. *Klinisk Aarbog*, 1884.

677. IWANOW. Observations on the spread of trachoma in the regiment. *Rusk. med.*, 1885, No. 44.

678. KAZAUROW. On blindness due to blenorrhœa neonatorum and the measures for preventing it. *Jarostow*, 1885, No. 10.

679. LANG. Pemphigus of the conjunctiva. *The Lancet*, 1885, vol. ii., No. 22.

680. LEE, C. G. Gumma of the ocular conjunctiva, cure, remarks. *The Lancet*, 1885, vol. ii., p. 803.

681. MONOD. Ophthalmie purulente des nouveau-nés. *Gaz. heb. des sci. méd. de Bordeaux*, 1885, Nos. 33 and 34, pp. 329 and 348. Nothing new.

682. PRINCE. Sur l'emploi de l'eau oxygénée dans la traitement de la conjonctivite purulente et des abscès de l'apophyse mastoide. *Ann. des mal. de l'oreille et du larynx*, 1885, vol. xi., p. 48.

683. RAEHLMANN, E. On trachoma. Collection of clinical lectures No. 263. Leipzig, 1885.

684. v. REUSS. Conjunctivitis jequiritica. *Wiener med. Presse*, 1885, No. 43.

685. RICHTER, R. The treatment of granular conjunctivitis by excision. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 73.

686. SIMI. Ancora sul jequirity. *Boll. d'ocul.*, vol. viii., 2.

687. STANEKE, C. On vernal catarrh of the conjunctiva. *Inaug. Diss.*, Bonn, 1885.

688. ULRICH. Demonstration of tubercle bacilli in tuberculosis of the conjunctiva. *Centralbl. f. prakt. Augenhk.*, 1885, p. 359.

689. WATSON, SPENCER. Peritomy for granular lids and pannus corneæ. *The Lancet*, 1885, vol. ii., No. 17.

ALT (667) recommends inspersion of jequirity in trachoma as safer than the usual method. BURNETT.

BAUDON (668) reports a case of chancre of the ocular conjunctiva. The tumor was situated at the æquator of the eye, and spread thence around the cornea beneath the upper lid. The cornea was healthy, although surrounded on all sides by a hard ring, which below was almost 1 *mm.* thick. The tumor had developed in the course of a month. It disappeared in two months under anti-syphilitic treatment. MARCKWORT.

CECCHINI (672) scrapes out the trachoma granules with a sharp spoon and cauterizes the whole conjunctiva with solid nitrate of silver and afterwards with sulphate of copper. He believes that the new membrane which forms after the eschar has been cast off, and which is covered with epithelium, is the equivalent of conjunctiva. He claims to have observed marked clearing up of pannus. DANTONE.

GLORIEUX (673) performed the following experiments on frogs

and rabbits for the purpose of studying the nature of the atropine idiosyncrasy: A ligated foot of a frog was immersed for several hours in a solution of atropine (1-5 %), while the other ligated foot was placed in water. Glorieux observed symptoms of inflammation in the atropinized foot after removing the ligature corresponding in intensity to the concentration of the solution. Glorieux observed a similar inflammation in a ligated rabbit's ear into which he had previously injected atropine, for the purpose of comparison; a solution or chloride of sodium had been injected into the other ear. According to Glorieux the atropine-inflammation is the result of relaxation of the muscular coat of the blood-vessels, and the idiosyncrasy for atropine is attributable to a special weakness of these muscles. A rational treatment for atropine-conjunctivitis would therefore be warm applications and astringents. MARCKWORT.

GRATSCH (674) favors Credé's method and the adoption of compulsory legislation. HIRSCHMANN.

HJORT (676) calls attention to the frequency of chronic hyperæmia of the conjunctiva and chronic follicular catarrh and warns against irritative treatment. Among its causes he mentions the impurity of the air in school-rooms, factories, etc. He treats such affections with weak solutions of boracic acid, zinc, or lead, frequently combined with inunctions of a salve of yellow oxide of mercury. SCHJÖTZ.

Among 1,522 soldiers examined IWANOW (677) found 300, *i. e.*, 19.7 % affected with trachoma. Among the recruits when admitted the percentage of trachoma was only 5.7, but in six months it had risen to 9.5. Of the soldiers who had been in the regiment longer than a year 23.3 % were trachomatous, while the number of recruits thus affected had varied in the last five years between 2 and 5.7 %. After an examination of the lodgings of the different companies the author concludes that impure air alone does not cause the spread of trachoma, that damp lodgings favor it to a certain extent, but that direct infection with the microbes is the only cause of the spread of trachoma. HIRSCHMANN.

KAZAUROW (678) favors Credé's method, and hopes that government will aid in introducing it among the people. HIRSCHMANN.

LANG (679) reports two cases of pemphigus of the conjunctiva. The first was that of a woman aged fifty-two years, who had suffered from ulcers of the neck since childhood. In 1883, the ocu-

lar affection began, in consequence of which the palpebral fissure became shorter in both eyes, while the lids themselves became adherent to the globe. A dull, thick membrane took the place of the conjunctiva. The eyeballs were almost immovable, but the lids could still be closed. The cornea was not affected. In a woman twenty-four years old, ten years ago an eruption appeared on the hands and afterwards on the remainder of the body. The eyes also became affected, and entropium resulted in consequence. For the last three years there has been no change in the condition.

RAEHLMANN (683) designates as trachoma a follicular inflammation of the conjunctiva. It may be sub-divided into three stages, that of the development of follicles, that of the destruction of the follicles and of ulceration, and that of cicatrization. There is an acute and a chronic form of trachoma. In the latter, small, round, yellowish-gray dots, are first observed on the conjunctiva of the lids, which gradually increase in size and develop into translucent granules of a gray or grayish-yellow color, the size of which is the greater the nearer they are to the fornix. This process is attended in many cases with very little inflammation. As long as the disease is still in the stage of granulation, absorption, and therefore a cure, is possible. This can be effected the more readily, the smaller the granules and the more superficial their position. When the disease is once fully developed its transition into the further stages can generally not be prevented. The symptoms of irritation are due almost without exception to affections of the cornea, the latter taking the form of trachomatous pannus in more than half the cases. When the disease enters upon the second stage, the swelling of the mucous membrane increases. The granules generally lie so near together, that no free portion of mucous membrane remains between them. Then ulceration begins and the epithelium of the conjunctiva is cast off. The ulcers thus formed can extend to the cartilage of the lid. True granulations, like those of wounds, are the result. Finally cicatrices develop, arranged in spots and lines. In this stage the corneal complications are frequent and severe, and the ocular conjunctiva is greatly injected. The second stage is always followed by that of cicatrization and shrinkage. Connective tissue takes the place of the destroyed conjunctiva, and shrinks. The lid is thus shortened, and entropium, trichiasis, and distichiasis result with all their deleterious consequences. In distinction

from chronic trachoma there is a form of acute follicular conjunctivitis which may be called acute trachoma. Trachoma-granules half the size of a pinhead and arranged in rows develop upon the conjunctiva of the lids, and especially at the fornix, accompanied with intense injection. They are round and prominent, slightly opalescent, and of a grayish-red or yellowish-red color. Curiously enough there are always more at the lower than at the upper fornix. Sometimes the affection is complicated with slight pannus or phlyctenular keratitis. Most cases recover, but the disease may become chronic and pass through all the stages of chronic trachoma.

RICHTER (685) recommends excision according to Heisrath in trachoma, and reports a series of cases treated according to this method. He also calls attention to the advantages of this method over that of Schneller.

SIMI (686) reviews the results obtained with jequirity, and pronounces in favor of the remedy.

After describing seven cases of vernal catarrh, all of which occurred in spring and relapsed at the same time, STANEKE (687) calls attention to the fact that weak solutions of boracic acid had a favorable effect on the course of the disease, as they diminished the secretion. Cocaine was also used with success, but its action was of too short a duration.

ULRICH (688) saw in two cases well-marked ulceration in the conjunctiva of the tarsus and the fornix. Both patients were members of a tubercular family. A piece of the conjunctiva was excised, and tubercle bacilli could be demonstrated with the aid of Ehrlich's method.

SPENCER WATSON (689) performed peritomy in a case of granulations with opacities of the cornea. The operation was only partially successful, for although the cornea became a little clearer, the condition of the conjunctiva remained the same.

690. ABADIE, CH. Staphylômes cornéens et synéchies antérieures. Accidents qui peuvent en être la conséquence. *Arch. d'ophth.*, 1885, No. 6, p. 499.

691. ANCKE, R. One hundred cases of diffuse parenchymatous keratitis. *Centralbl. f. prakt. Augenhk.*, 1885, p. 360.

692. BAKER, A. W. W., and STORY, J. B. Hereditary syphilis, dental malformations, and diffuse interstitial keratitis. *Ophth. Rev.*, 1886, p. 321.

693. CRITCHETT, A., and JULER H. Vesicle of the cornea. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 46.

694. DANTZIGER, C. Contribution to the application of massage in opthalmology. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 3, p. 187.

695. FERRET. Trois observations de kératite vésiculeuse. *Bull. de la clin. nat. ophth.*, 1885, No. 3, p. 187. Cases.

696. FOURNIER. De la syphilis héréditaire tardive. *Rec. d'ophth.*, 1885, No. 12, p. 705.

697. FRÖHLICH, C. On galvanocautery. *Arch. f. Augenhk.*, vol. xvi., p. 17.

698. GORDON, L. A. The glowing-iron as a remedy in corneal ulcers. *Wratsch.*, 1885, No. 41.

699. HIGGINS, CH. Method of operating for conical cornea. *Brit. med. Journ.*, Nov. 28, 1885.

700. HOCK, J. Keratitis dendritica exulcerans. *Centralbl. f. prakt. Augenhk.*, 1885, p. 380.

701. DE JAGER. Pigmentring in the cornea. *Weekblad*, 1885, No. 41.

702. MACKINLAY, J. G. Corneal pigmentation by aniline. *Ophth. Soc. Unit. King.*, Oct. 15, 1885.

703. RENTON, J. C. Note on the value of the thermocautery in the treatment of sloughy ulceration of the nornea. *Ophth. Rev.*, 1885, p. 353.

According to ABADIE (690) the indications for his staphylotomy differ from those for sclero-iridectomy according to Panas. Abadie performs his operation in corneal staphylomas or anterior synechiæ and their consequences (glaucoma). He enters the anterior chamber with the cataract-knife, so that the iris lies upon its edge, then makes the counter-puncture and cuts both the adhesion and cornea, leaving only a small bridge of the latter. (The division of anterior synechiæ has been performed by others also; for instance, Galezowski, who constructed a sickle-shaped knife in order to operate without evacuating the anterior chamber. Rev.) v. MITTELSTÄDT.

Among the one hundred cases of diffuse parenchymatous keratitis collected by ANCKE (691), sixty-two males and thirty-eight females, both eyes were affected in thirty-eight cases, but never simultaneously. The disease occurred most frequently in persons under twenty years of age. In thirty-seven cases syphilis could be shown to exist (in twenty-seven of them congenital, in ten acquired), while in twenty-four this was doubtful; in thirty-nine

cases there were no indications of syphilis. In twenty-seven cases the teeth were not normal; Hutchinson's deformity was found in eleven cases (seven of which had syphilis), in six cases the incisors were wedge-shaped (syphilis in four of them), and in ten the teeth were ridged and defective. It was a curious fact that in sixteen cases there were changes in the pigment at the periphery.

BAKER and STORY (692) found Hutchinson's teeth in thirty-one among forty-eight cases of interstitial keratitis, in three the existence of this deformity was doubtful, in seven the teeth were normal, and in seven others no mention is made. In twenty of the forty-eight cases there were also other evidences of hereditary syphilis, in ten others the existence of the latter disease was probable; in the remainder there was no indication of it. The age of the patients varied between four and thirty years.

CRITCHETT and JULER (693) observed a well-defined vesicle on the centre of the cornea of a laborer fifty-four years old, the contents of which were clear and colorless. It caused pain and photophobia, but there was only slight pericorneal injection. No traces of herpes could be found. The vesicle burst under a compressive bandage, and the affection healed without any evil results.

DANTZIGER (694) saw six cases of corneal opacities improve under the application of yellow ointment and massage, and four others after abrasion of the cornea and massage.

FOURNIER (696) publishes an excellent paper on parenchymatous keratitis, and strongly supports the opinion of Hutchinson, that this affection is due to hereditary syphilis. He even says that in cases in which hereditary syphilis is doubtful, careful search should be made for traces of a former parenchymatous keratitis, as they are of great diagnostic importance. MARCKWORT.

FRÖHLICH (697) favors galvanocautery in corneal and conjunctival affections due to mycotic infection.

GORDON (698) prefers Paquelin's thermocautery as modified for operations on the eye. He cauterizes the floor of the ulcer. In deep ulcers he perforates the cornea with the instrument, instead of performing keratotomy according to Saemisch. The author recommends cauterization of all rapidly spreading ulcers of an atonic and mycotic character, especially superficial ulcers. The author has treated 20 cases according to this method, 8 of which he describes at length. HIRSCHMANN.

HIGGINS (699) describes his method of operating for conical cornea. MAXWELL.

HOCK (700) reports two cases of keratitis dendritica exulcerans similar to that of Emmert; he leaves it in doubt, however, whether the disease is of mycotic origin.

MACKINLAY (702) saw the cornea and conjunctiva of a deep-brown color in a man aged 44, who had worked for seven years in an aniline factory, ten hours and a half daily. The iris was scarcely visible. The skin of the face, neck, and hands was also of a reddish-brown color.

According to RENTON (703) the thermocautery may be used with good results in corneal ulcers, especially those due to an injury and where there is a small hypopyon.

704. GALLENGA. Contribution à l'étude des tumeurs congénitales de la conjonctive et de la cornée. Considérations sur leur genèse. *Ann. d'ocul.*, vol. xciv., p. 215.

705. KUHNT, H. On scleral operations. *Tageblatt. d. Naturforscher-Versamml. zu Strassburg*, 1885, p. 497. Conf., p. 78.

706. LANDESBERG. The application of sutures in scleral wounds. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiii., p. 519. Report of 7 cases.

GALLENGA (704) removed a dermoid tumor of the sclero-corneal margin, and gives a description of it. He found in it a piece of cartilage $\frac{5}{6}$ *mm.* long and $\frac{1}{2}$ *mm.* wide, resembling in this respect a case of Graefe examined by Schweigger. Gallenga therefore thinks that the tumor had some connection with the plica semilunaris, which was probably enlarged during intra-uterine life. MARCKWORT.

707. MASSE, E. Kystes, tumeurs perlées et tumeurs dermoides de l'iris, Paris, 1885.

MASSE'S (707) paper discusses the cysts growing from the iris into the anterior chamber.

708. BELARMINOFF. The question of the action of cocaine upon the eye. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiii., p. 511.

709. CAUDWELL, E. Cocaine. *Brit. Med. Jour.*, Jan. 3, 1885.

710. EVERSBUSCH. Some remarks on the physiological action of cocaine. *Centralbl. f. prakt. Augenhk.*, 1885, p. 289.

711. EVERSBUSCH. Remarks on keeping the solution of co-

caine pure, and on the manner of using it upon the eye. *Münchener med. Wochenschr.*, 1885, No. 44.

712. Howe, L. Effect of cocaine on the healing of wounds. *Trans. Med. Soc.*, N. Y., 1885.

713. Krüger, H. Experimental investigations on the action of cocaine and its substitutes upon the blood-vessels. *Inaug. Diss.*, Berlin, 1885.

714. van Millingen. On cocaine. *Centralbl. f. prakt. Augenhk.*, 1885, p. 370.

715. Nettleship, E. Dangers of Cocaine. *The Lancet*, 1885, vol. ii., No. 17.

716. Pierd'houy. L'alveloz, la jaborina, l'idroclorate di idrastino, i sali di aconitina anestetici. *Gaz. med. Ital. Lomb.*, vol. xiv., 1885.

717. Robertson, A. Caffeine. *Brit. Med. Jour.* Jan. 3, 1885.

718. Snell, S. The mydriasis of cocaine. *Brit. Med. Jour.*, July 25, 1885.

719. Wicherkiewicz, B. The injurious effects of cocaine. *Centralbl. f. prakt. Augenhk.*, 1885, p. 368.

Belarminoff (708) finds that the enlargement of the palpebral fissure is due to a diminution of the reflexes upon the orbicularis muscle and an irritation of a branch of the sympathetic nerve, which produces a contraction of Müller's muscle.

Caudwell (709) finds that cocaine exerts a double action, namely as a cerebral sedative in small doses, and as a cerebral stimulant in large doses; that given internally it dilates the pupils, and that it possesses no toxic action, unless in large doses.

Maxwell.

Eversbusch (710) defends his views as to the action of cocaine upon the eye in opposition to the assertions of Pflüger and A. Weber. Besides the possible action of contact upon the ends of the sensitive nerves, the remedy excites the vaso-constrictors.

In order to keep a cocaine solution pure, Eversbusch (711) recommends a mixture of 20 grms. of a sublimate solution of 1-4,000, and 20 grms. of a saturated aqueous solution of salicylic acid, to be used as a solvent for the cocaine. Impurities are thus avoided.

Howe (712) has shown that solutions of cocaine have no effect on the healing of conjunctival wounds; that in wounds of the

cornea and iris they are beneficial like other mydriatics, but less so than atropine. BURNETT.

KRÜGER (713) found by experiments on frogs that cocaine in small doses stimulates, in larger ones paralyzes the nerves of the blood-vessels.

In cataract-operations MILLINGEN (714) uses a sterilized solution of cocaine, which always has an anæsthetizing effect.

NETTLESHIP (715) observed panophthalmitis after the introduction of cocaine gelatine-discs. He thinks that gelatine is a good soil for pathogenic organisms.

PIERD'HOUY (716) has experimented with muriate of alveloz, jaborine, and hydrastine, but the results were not satisfactory. He found, however, that the salts of aconite have an anæsthetizing effect upon the cornea and conjunctiva equal to that of cocaine. As they produce more irritation, however, they are less desirable. A solution of one fourth of one per cent. is borne best, but its effect is of very short duration.

ROBERTSON'S (717) experiments with caffeine and its salts to ascertain whether they produced any sedative effect on the conjunctiva, were attended in all cases with negative results

MAXWELL.

SNELL (718) has observed that the mydriasis of cocaine is abolished while the patient is under a general anæsthetic, and that when the patient recovers mydriasis returns. The effect of chloroform is more marked in this respect than that of ether.

MAXWELL.

WICHERKIEWICZ (719) believes that the haziness of the cornea observed by Bunge and others after cocaine, is not due to the remedy, but to the strong solution of sublimate which is used besides. Cocaine, however, occasionally causes hypotony, its only unpleasant secondary action, preventing an exact adaptation of the edges of the wound.

Sections XII.–XXI., reviewed by DR. NIEDEN.

XII.—IRIS.

720. BENSON. A case of uniocular coloboma of the choroid, iris, and lens, with a bridge of iris-tissue over the coloboma. *Ophth. Soc. Rep.*, 1885, p. 351.

721. DOR. Albinisme partiel de l'iris. *Rev. gén. d'ophth.*, 1885, No. 11.

722. LAWRENTJEW. Contribution to the congenital anomalies of the iris. *Wratsch*, Nos. 41 and 42.

723. LUNDY, C. J. Iritis, its relation to the rheumatic diathesis and its treatment. *Physician and Surgeon*, Sept., 1885.

724. STÖLTING (Horner's clinic). The development of the serous cysts of the iris. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 3, p. 99.

725. TROUSSEAU. Iritis hérédo-syphilitique chez un enfant de six mois. *Ann. de dermat. et de syph.*, 1885.

DOR (721) describes a case of partial albinism of the iris. It differs from that of Franke (*Centralbl. f. prakt. Augenhk.*, April, 1885, and *Arch. f. Augenhk*, vol. xv., p. 435), inasmuch as the anterior surface of the iris was normal and oblique illumination revealed no traces of atrophy. The ophthalmoscopic examination showed that the inner sixth of the iris was transparent like in albinos; this portion did not dilate under the influence of atropine. MARCKWORT.

LAWRENTJEW (722) observed a case of congenital complete irideremia and stellate cataract in both eyes. The patient is a musician, thirty-eight years. Both corneæ are oval, with peripheric annular opacities. When the eye is moved outwards, inwards, upwards-outwards, and downwards-outwards, there is oscillating nystagmus; slight alternating convergent strabismus. Visual field limited in both eyes upwards-inwards; $N = \frac{8}{200}$; neither convex nor concave glasses improve sight. The patient can read with the left eye only when the longitudinal axis of the letters is placed horizontally. When he reads there is constant nystagmus. The ciliary processes are not visible. There is no trace of accommodation. The parents, brothers, sisters, and children of the patient have healthy eyes. The author favors Manz' explanation of the cause of irideremia. The opacity in the lens he attributes to the disturbed nutrition of the lens, and not to an accidental coincidence.

LUNDY (723) is convinced that the rheumatic diathesis lies back of iritis in a very large percentage of cases. He has found his cases of iritis to subside very rapidly under active anti-rheumatic treatment, particularly large doses of salicylate of sodium. BURNETT.

After describing the microscopical appearance of two cases of serous cysts of the iris, STÖLTING (724) reverts to the theory of Buhl-Rothmund as to their development, according to which they

are due to the transfer of epithelium of the cornea or conjunctiva to the iris. When the epithelium of the cornea covers the edges of the corneal wound, a canal, lined with epithelium, is formed, the inner opening of which is closed with iris-tissue. When the epithelium extends to the iris and covers the portion adjacent to the corneal wound, a superficial occlusion is sufficient to give rise to the development of a cyst.

TROUSSEAU (725) reports a very interesting case of iritis due to hereditary syphilis. He observed in the left eye of a girl six months old, lachrymation, photophobia, pain, injection of the ocular conjunctiva, opacity of the cornea, and deposits on Descemet's membrane, turbid aqueous, green discoloration of the iris and protrusion at some points, posterior synechiæ, irregular, narrow pupil, and near its upper inner edge three yellow nodules. Recovery under anti-syphilitic treatment. MARCKWORT.

XIII.—CHOROID.

726. BÈGUE. Déchirure de la chorioide, suite d'un traumatisme. *Bull. de la clin. nat. ophth*, 1885, vol. iii., p. 193.

727. NORDENSON, A. Case of cavernous sarcoma of the choroid with a bony shell in a girl eleven years old. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 59.

NORDENSON (727) describes a rare case of cavernous sarcoma of the choroid in a girl eleven years old, which was complicated with the formation of bone and a peculiar form of partial staphyloma at the sclero-corneal margin, cataract with irregular shrinkage of the lens, capsular cataract, and rupture of both the anterior and posterior lens-capsules. The last-named changes could only be attributed to an injury.

XIV.—GLAUCOMA.

728. BRAILEY, W. A. On the advance of the periphery of the iris in glaucoma. *Brit. Med. Jour.*, May 30, 1885.

729. BRAILEY, W. A. Glaucoma operation. *Brit. Med. Jour.*, Oct. 10, 1885.

730. COGGIN, D. Eserine sulphate in glaucoma. *Amer. Jour. Ophth.*, Nov., 1885.

731. HEWELSON. Case of glaucoma. *Brit. Med. Jour.*, Feb. 28, 1885.

732. MANZ. An attack of glaucoma after cocaine. *xvii. Sitzungsber. d. Heidelb. Ophth. Gesellsch.*, 1885.

733. MENGIN. Note sur un cas de glaucome double. *Rec. d'ophth.*, 1885, p. 104.

734. SCHÖN. The etiology of glaucoma. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 1.

735. SMITH. Chronic glaucoma. *Ophth. Rev.*, 1885, p. 261.

736. WEBSTER, D. A case in which the enucleation of one eye for absolute glaucoma was followed within thirty-six hours by an attack of acute glaucoma in the fellow-eye. *Trans. Amer. Ophth. Soc.*, 1885.

737. WEBSTER, D. Operations for glaucoma occurring in the practice of C. R. Agnew, M.D. Four cases of iridectomy in both eyes, eight of iridectomy in only one eye. *Amer. Jour. Ophth.*, Nov., 1885.

738. WEBSTER, D. Cases of glaucoma operated upon by Dr. Agnew. *Amer. Jour. Ophth.*, Dec., 1885.

BRAILEY (728) thinks that the advance of the periphery of the iris in glaucoma marks the entry of the disease on a new and less curable stage, in which myotics are of no use and operation is more difficult. After giving the causes of this advance, he states what he believes to be some facts. (1) There is no atrophy of the ciliary body (inclusive of its muscular parts) in the early stages of glaucoma, but it is due to the subsequent application of the iris to the cornea. (2) The anterior chamber is rendered shallow in the earlier stages of glaucoma by a partial advance of the lens and iris. But later, when the margin of the iris has become applied to the iris in the region of the ligamentum pectinatum and when atrophy of the ciliary body has set in, the lens recedes to its normal place. (3) In most cases of glaucoma the vitreous body is at least not below the normal size. In some cases it is shrunken and detached from the retina by fluid. (4) The canal of Schlemm is open at least as wide as normal up to and for some time after the establishment of glaucoma. The ligamentum pectinatum also presents its usual loose structure. (5) The lens does not usually exceed its normal size. (6) There is no evidence that the ciliary folds are swollen in glaucoma, though from the enlargement of the ciliary arteries so frequently found, we must admit that the condition is not improbable. MAXWELL.

BRAILEY (729) records several cases in which he had stretched

the supratrochlear nerve in glaucoma for the relief of pain and tension. In most of them there was a more or less permanent relief of both conditions. MAXWELL.

COGGIN (730) improved vision with eserine in two cases of glaucoma in which, under ordinary circumstances, an operation would have been necessary. BURNETT.

HEWELSON (731) showed a girl, aged 18, who had had an attack of acute glaucoma, with almost complete loss of vision. Perfect sight was restored in a week, after iridectomy had been performed. The point of interest was the youth of the patient. MAXWELL.

MENGIN (733) reports one of those not infrequent cases in which, a few days after the operation for glaucoma in one eye, the disease breaks out in the other. Mengin therefore advises to operate, not only the eye in which an attack of acute or subacute glaucoma has developed, but also the other, as a prophylactic measure, the operation being easier at that time. MARCKWORT.

SCHÖN (734) seeks the etiology of glaucoma in a functional relative insufficiency of the circular fibres, and of the inner and meridional fibres, which prevent the advance of the lens.

SMITH (735) reports a case of chronic glaucoma of unusually long duration, the diagnosis having been made twenty years before operative treatment was undertaken. Excess of tension was present at the beginning of this period, and also at the close; probably intermittent throughout. Very deep excavation of the discs and moderate contraction of the fields coexisted, with good sight. Iridectomy gave excellent results in both eyes. The ill-effects of exhaustion and mental anxiety where glaucoma is imminent were well-shown in this case. FITZGERALD.

WEBSTER (737) reports the results of 30 cases of glaucoma operated upon, in 11 of which sight was improved, 6 got worse, and 13 remained unchanged. In some cases, the visual fields were considerably enlarged, as a result of the operation, while central vision was somewhat lowered. BURNETT.

WEBSTER (738) briefly reports four cases in which iridectomy was performed on both eyes at varying intervals, and eight cases in which only one eye was operated on. BURNETT.

XV.—SPMPATHETIC OPHTHALMIA.

739. ANDREW, EDWYN. On enucleation of the eyeball, with obliteration of the conjunctival sac. *Brit. Med. Jour.*, Dec. 19, 1885.

740. ROSE, JAMES. A case of sympathetic ophthalmitis. *Brit. Med. Jour.*, Aug. 29, 1885.

After mentioning the dangers of sympathetic ophthalmia, and the unsatisfactory nature of treatment when it was once established, ANDREW (739) speaks of the importance of early enucleation. He said the danger of meningitis following excision in panophtalmitis was much exaggerated. He has found that one of the first symptoms in the sound eye was a diminished acuteness of distant vision, while that of near vision remained unaltered; another, the diminshed dilatability of the pupil under atropine. He employs for this purpose a solution of 1—6,000. He tests the sound eye in these two ways at the first visit. In cases in which an artificial eye cannot be worn, he obliterates the whole conjunctival sac by excising the conjunctiva, removing a sufficient strip of free border of the lids to include all the hair-roots, and uniting the edges of the lids with sutures. MAXWELL.

ROSE (740) describes a case of sympathetic ophthalmitis occurring forty-seven years after injury in a woman 53 years of age. He believed the irritation only became developed when the bony shell, which had formed in the small phthisical eye had enlarged sufficiently to press on the soft parts contracting around it. The other eye, which had hitherto resisted treatment, recovered.

MAXWELL.

XVI.—LENS.

741. ARLT. Hints on cataract-operations. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 3, p. 1.

742. BETTREMIEUX. Étude sur l'extraction de la cataracte. Indications de l'iridectomie et recherches sur l'antisepsie opératoire. *Arch. d'Ophth.*, vol. v., No. 6, p. 508, Nov., Dec., 1885.

743. BERRY. After-treatment of cataract-extractions. *Ophth. Rev.*, Sept., 1885, p. 257.

744. BRETTAUER. Three cases of spontaneous clearing-up of senile cataracts, the capsule being uninjured, with restoration of vision. *xviii. Ber. d. ophth. Gesellsch. zu Heidelberg*, 1885, p. 47.

745. COSTALDI. Brevi considerazioni pratiche sulla estrazione della cateratta. *Morgagni*, vol. xxvii., 11–12.

746. DUJARDIN. Extraction de cataracte par un nouveau procédé. *Jour. des sci. méd. de Lille*, vol. vii., 1885.

747. EWSEJENKO. On the unfavorable effect of cocaine in cataract-operations. *Wjestnik ophth.*, Nov., Dec.

748. GALEZOWSKI. Traitement chirurgical de la cataracte. Leç. rec. par Dr. Boucher. *Prog. méd.*, vol. lxvii., p. 469, 1885.

749. GALEZOWSKI. Emploi des rondelles de gélatine pour l'exclusion de la plaie cornéenne après l'extraction de la cataracte. *Rec. d'ophth.*, Oct., 1885, p. 577.

750. GALEZOWSKI. Soins préliminaires à donner aux malades avant l'opération de la cataracte. *Rec. d'ophth.*, Dec., 1885.

751. GIRARD. Cataractes secondaires et resources opératoires, fourche à iridectomie. *Rev. trim. d'ophth. prat.*, Oct. 1885.

752. GUAITA. Ablazione della cateratta. *Giorn. internaz. di Sci. med.*, vol. vii., 7–10. Continuation and conclusion.

753. POOLEY, T. R. A modification of Förster's method of artificially ripening cataract. *N. Y. Med. Jour.*, Dec. 26, 1885.

754. RAMPOLDI. L'asepsi nell' operazione della cateratta. *Gaz. med. ital. Lomb.*, vol. xlv., p. 43.

755. REDARD, P. Sur les procédés à employer dans le traitement de la cataracte molle. *France méd.*, 1885, No. 94. Recommends aspiration in suitable cases.

756. ROOSA, D. B. ST. JOHN. Remarks on the extraction of the crystalline lens in its capsule. *Trans. Amer. Ophth. Soc.*, 1885.

757. SCHIESS-GEMUSEUS. Contribution to the knowledge of the congenital anomalies of the lens. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 53.

758. TANNAHILL. A case of double diabetic cataract. *Brit. Med. Jour.*, June 30, 1885.

759. WADSWORTH, O. F. Luxation of the lens beneath Tenon's capsule. *Trans. Amer. Ophth. Soc.*, 1885.

760. WEBSTER, D. Extraction of a lens dislocated into the vitreous with the aid of Dr. Agnew's bident. *Trans. Amer. Ophth. Soc.*, 1885.

761. WECKER. Les causes de suppuration et d'inflammation après l'extraction de la cataracte. *Ann. d'ocul.*, vol. xciv., p. 224.

ARLT (741), in his treatise on cataract-extractions, touches on many questions of practical importance. His great experience lends particular weight to his views, when differing from those of other operators. The paper furnishes another proof of his undiminished activity and love of science.

BETTREMIEUX (742) reports nothing new in addition to the

paper of Panas (*Arch. d'ophth.*, vol. v., No. 4, July–Aug., 1885, p. 289) on the same subject. He mentions that after the extraction, Panas washes out the anterior chamber with a solution of biniodide of mercury, and is well satisfied with the results.

BERRY (743) gives an accurate description of his method of the after-treatment of cataract, which does not differ materially from the antiseptic method now in general use. In chronic conjunctivitis and epiphora only does he apply a thick layer of iodoform to the wound. He bandages only the operated eye. The patient should be kept in bed for the first two or three days.

FITZGERALD.

EWSEJENKO (747) thinks he may draw the conclusion from two cases of cataract-extraction, that cocaine reduces the secretion of aqueous for a long time, rendering the removal of cortical masses difficult, and retarding the healing. HIRSCHMANN.

According to GALEZOWSKI (750), attention should be paid to the following conditions before operating for cataract: Diseases of the urinary organs, alcoholism, diabetes, uric acid dyscrasia, neuralgia of the fifth nerve, syphilis, and menopause. These conditions should be improved or cured, or the operation delayed until they have run their course. MARCKWORT.

GIRARD (751) has constructed a delicate fork, the two prongs of which are 1 *mm.* apart and 6 *mm.* long. It is used in operating secondary cataracts, which have become adherent to the iris. When the iris is incised with the Sichel knife, which moves between the prongs, the fork prevents the iris from escaping forwards. MARCKWORT.

POOLEY (753) suggests that the process of Förster can be carried out without performing an iridectomy, by making a paracentesis of the anterior chamber and allowing the lens to fall against the cornea, and by rubbing the cornea over the exposed lens surface. He has successfully tried it on rabbits. BURNETT.

ROOSA (756) describes the method he now employs for cataract-extraction, which consists in making the puncture and counter-puncture as in the ordinary method, then turning the back of the knife two or three times on the surface of the lens, causing a dislocation of the latter, and then completing the section. The lens within the capsule is then manipulated out by means of two rubber spoons, or the fingers and a spoon. No iridectomy is performed, but if there is a failure to dislocate the lens, or if the iris falls in front of the knife, the usual extraction with iridectomy can

be made. He has, up to this time, performed thirty extractions, with a loss of two, neither of which could be referred to the method of operating. BURNETT.

SCHIESS-GEMUSEUS (757) describes a case of congenital defect of the lens in its lower portion in both eyes in a myopic boy. The zonula was not absent in the part in question.

TANNAHILL (758) describes a case of double diabetic cataract. Both lenses were nearly opaque, and the patient could only distinguish large objects. Two grains of opium were given daily, along with proper diabetic diet, and in fourteen days no trace of cataract could be seen, and he was able to read the smallest print. MAXWELL.

WADSWORTH (759) describes a case of dislocation of the lens beneath Tenon's capsule, in a man forty-seven years old, who had received a blow on the left eye from the horn of a cow. As the eye was painful, it was enucleated, and the lens on section of the globe was found under the capsule of Tenon, close to the cornea, between the external and superior recti. The rupture in the sclerotic, through which it had escaped, had healed. BURNETT.

WEBSTER (760) gives the history of a case in which he used Dr. Agnew's bident for bringing forward and fixing a dislocated lens against the cornea. Extraction downwards; $V = \frac{20}{100}$ with $+ 9$ D. BURNETT.

WECKER (761) combats Arlt's defence of the peripheric linear extraction (*Arch. f. Ophth.*, vol. xxxi., p. 33). While Arlt says that the cases of immediate loss from suppuration of the cornea or severe iridocyclitis occur only half as often after the peripheric linear-extraction as they do after the flap-extraction, as experience has shown, Wecker believes that severe iridocyclitis occurs oftener and is more destructive after the linear section. The objection of the greater frequency of suppuration of the cornea can only be applied to the old flap-extraction, and not one involving only one third of the circumferance. Wecker does not admit that the tendency to disease is of any consequence in the etiology of suppuration of the cornea, except that perhaps a better soil may thus be furnished for the germs of infection. MARCKWORT.

XVII.—VITREOUS.

762. SEELY, W. W. A second case of serous effusion into the vitreous humor, probably due to malaria. *Trans. Am. Ophth. Soc.*, 1885.

The author reports another case of grayish infiltration of the vitreous, which he attributes to malaria. BURNETT.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

763. ANDERSON. Symmetrical defect in the lower halves of both fields of vision. *Ophth. Rev.*, Aug., 1885, p. 225.

764. BENSON. Monocular micropsia. *Ophth. Rev.*, 1885, p. 230.

765. BULL, C. S. Two cases of unilateral temporal hemianopsia. *Trans. Amer. Ophth. Soc.*, 1885.

766. HIRSCHBERG, J. Contribution to the knowledge of embolism of the retinal artery. *C. f. A.*, vol. ix., p. 353.

767. HODGES. Thrombosis of retinal artery. *Ophth. Rev.*, 1885, p. 296.

768. HORSTMANN. On anæsthesia of the retina. *Deutsche med. Wochenschr.*, 1885, No. 20.

769. KNAPP, H. Embolism of the retinal artery, with preservation of the macular branch. *xvii. Ber. d. ophth. Gesellsch.*, Heidelberg, 1885.

770. KNAPP, H. Congenital, circular, grayish-white opacity around the fovea centralis. *xvii. Ber. d. ophth. Gesellsch.*, Heidelberg, 1885, p. 217.

771. LAWFORD. Central amblyopia. *Ophth. Rev.*, 1885, p. 232.

772. NETTLESHIP. Recovery from amaurosis in young children. *Ophth. Rev.*, 1885, p. 243.

773. NORDENSON. The pathological anatomy of genuine detachment of the retina. *xvii. Ber. d. ophth. Gesellsch.*, Heidelberg, 1885, p. 58.

774. SEDAN. Une famille d'héméralopie. *Rec. d'ophth.*, Nov., 1885.

775. VILMAIN. Note sur un cas d'amaurose traumatique. *Rec. d'ophth.*, Nov., 1885.

776. WERNER, L. A case of complete detachment of the retina, with numerous cholesterine crystals in the sub-retinal fluid. *Brit. Med. Jour.*, Aug. 8, 1885.

777. WILBRAND, H. Case of right-sided lateral hemianopsia and autopsy. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 1, p. 119.

778. WILLIAMS, E. Quinine amaurosis. *Trans. Amer. Ophth. Soc.*, 1885.

ANDERSON (763) presents at length the history of a patient suffering from a symmetrical defect of the lower halves of both fields of vision. The patient, twenty-eight years old, was addicted to the use of alcohol and tobacco, and on account of several attacks of fever, was taking at the time about ten grains of quinine daily. When the fever had passed its height, cerebral disturbances developed, after which he noticed the impairment of vision and a certain weakness of the right side of his body. The latter condition improved. The pupil reacted slowly, and was wide, the right disc pale with a deep funnel-shaped excavation, white lines along some vessels on the side of the yellow spot only. In the left eye the condition was the same, but not so well marked. Motor power of the right side seemed perfect, but patient complained that it felt weak; sensation of that side was very defective. Anderson looks upon the case as one of lesion of the posterior segment of the left internal capsule, and chiefly of the sensory fibres occupying the posterior third of this segment. It also affected the neighboring fibres lying in the middle third of the posterior or lenticulo-optic segment of the capsule. The lesion most probably resulted from a rupture or embolism of the lenticulo-optic branch of the left middle cerebral artery.

FITZGERALD.

BENSON (764) observed monocular micropsia in a young woman aged twenty-four, who, six months after an attack of diphtheria, followed by no paralysis, found that objects looked smaller with the right eye than with the left. Benson found the right pupil semi-dilated and acting sluggishly to light and accommodation. With + 3D before the right eye, J1 at 25 *cm.* seemed the same size as with the left without a glass. A drop of eserine had very nearly the same effect. FITZGERALD.

BULL (765) reports two cases of unilateral temporal hemianopsia. In the one it was due to a stroke of lightning, which also paralyzed the muscles of the left lower leg, and produced a central scotoma in the other eye. In the other case the unilateral irregular hemianopsia was associated with concentric limitation of the field of vision of the same eye. An injury to the head was the probable cause. BURNETT.

HIRSCHBERG (766) observed a case of embolism of the central retinal artery, with preservation of a so-called cilio-retinal branch,

in the territory of which the fundus had preserved its normal appearance in shape of a clearly outlined triangle, while the function of the retina was not impaired in that region. The cilio-retinal artery appeared to be an ordinary branch of the central artery. The heart was not affected. About three weeks before the ocular affection an incision had been made on account of angina phlegmonosa. The second case was one of partial embolism of the branch supplying the lower half of the retina in a person, aged twenty-two, without any cardiac affection. No cause could be discovered.

HODGES (767) observed thrombosis of the retinal artery in a girl aged eighteen. V was lost in the right eye in a quarter of an hour, and never returned. The ophthalmoscope showed the usual signs of blockage of the central retinal artery. The author thinks this was a case of thrombosis and not of embolism.

FITZGERALD.

HORSTMANN (768) reports five cases of anæsthesia of the retina, to which he proposes to give the name of "amblyopia of the visual field" (Schweigger), as the principal symptom is the limitation of the visual field. The affection is confined almost exclusively to women and children.

LAWFORD (771) reports the case of a young man aged eighteen who had sustained an injury of the head, followed by cerebral symptoms, which lasted for some time. The chief points of interest in the case were: 1. The existence coincidently of central visual defect and peripheral contraction of fields. 2. The central scotomata, which were at first absolute scotomata for form, became, in the process of recovery, scotomata for color only, and eventually disappeared, while there was still considerable peripheral contraction of fields.

FITZGERALD.

NETTLESHIP'S (772) object in this paper is to seek out what facts, in the history and present state of an amaurotic infant, point to the probability of his recovering sight. There is one group in which he thinks a favorable prognosis should probably never be given, viz.: that in which the sight is absent or defective from birth, several children from the same parents often affected, and the parents frequently are related. In the milder cases where the sight is not very bad, there is often total color-blindness, and Nettleship hazards the opinion that probably most cases of total color-blindness are really instances of congenital disease of the optic nerves. He thinks that recovery of sight is likely, though far

from certain, if the child could see well till some months after birth, and that then sight was lost during an illness with cerebral symptoms. Generally the blindness lasts from about one to six months. As regards the local cause, we may infer that intracranial inflammation certainly takes place, and perhaps spinal mischief as well. Nineteen cases are recorded, in eleven of which improvement or complete recovery took place. FITZGERALD.

SEDAN (774) reports the case of a gentleman aged thirty, who suffered from congenital hemeralopia without any disturbance of the color sense, without any affection of the liver, without any limitation of the visual field (whether this was also tested under diminished illumination is not stated), and without retinitis pigmentosa. There was no consanguinity of his progenitors. Of twenty-nine members of the family nineteen were hemeralopic. (H signifies hemeralopia in the following genealogical table.)

Family A.

- Daughter (H).
  - 1. Daughter (H).
    - 1. Son (H).
    - 2. Daughter.
    - 3. Daughter (H).
    - 4. Daughter.
  - 2. Son (H).
    - 1. Daughter (H).
    - 2. Son.
    - 3. Son (H).
  - 3. Son (H).
    - 1. Son (H).
    - 2. Son.
    - 3. Daughter (H).

Family B.

- Daughter (H).
  - Son (H).
    - 1. Son.
    - 2. Daughter (H).
    - 3. Daughter (H).
    - 4. Daughter (H).
    - 5. Daughter (H).
      - 1. Son (H).
      - 2. Son (H).
      - 3. Son (H).
    - 6. Son.
    - 7. Son.
  - Daughter.
    - 1. Son.
    - 2. Son.

MARCKWORT.

VILMAIN (775) describes a case of sudden blindness after a blow with a stick in the naso-ocular fold below the caruncle. The patient, however, was not seen until two months after the injury. In explanation of the instantaneous blindness and the atrophy subsequently found the author assumes a fracture of the orbital wall and rupture of the optic nerve within the optic foramen by a splinter of bone. MARCKWORT.

WERNER (776) describes a case of total detachment of the retina with numerous cholesterine crystals in the subrectinal fluid. Some of these crystals appeared to be imbedded in some transparent substance, while others seemed to float freely about. The detachment seems to have resulted from a blow upon the eye eleven months previously. The tension was normal and the eye in a quiescent condition. MAXWELL.

WILBRAND (777) reports a case of right-sided temporal hemianopsia in a man sixty-three years old. It developed rapidly, was at first incomplete, but soon assumed the form of an absolute lateral visual disturbance, complicated with choked disc in both eyes; V was normal in the right eye and reduced in the left. Afterwards there developed right-sided hemiplegia and an affection of the right facial and hypoglossus nerves, and aphasia. The choked disc meanwhile disappeared. The autopsy did not reveal a cerebral tumor, as had been expected, but a softened area, due to multiple embolisms of small cerebral blood-vessels, extending in the sagittal white layer close to the cortex of the apex of the left occipital lobe.

WILLIAMS (778) reports two cases of quinine amaurosis in relatives, both of whom had taken about 30 grms of quinine in a short space of time and four days later lost both sight and hearing. Vision returned after a few days, but a concentric limitation of the visual field remained while the color-sense was good. In one of the cases the optic nerves were white and the vessels much reduced in size. BURNETT.

XIX.—OPTIC NERVE.

779. DENTI. Saggio di idro-elettro-terapia oculare. *Gaz. med. ital. Lomb.*, vol. xlv., 51.

780. EDMUNDS. Optic neuritis. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 291.

781. FERRET. Atrophie papillaire consécutive à un traumatisme de la region temporale. *Bull. de la clin. nat. ophth.*, 1885, vol. iii., p. 197.

782. FERRET. Note sur une variété curable d'atrophie progressive de la papille. *Bull. de la clin. nat. ophth.*, 1885, vol. iii., p. 189.

783. NETTLESHIP, E. Retro-ocular neuritis. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 186.

784 NETTLESHIP, E. Atrophy of disc. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 286.

785. SILCOCK. Hemorrhage into sheaths of both optic nerves, the result of fracture of the skull. The clot filled the subdural sheath. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 274.

786. SHARKEY and LAWFORD. Acute optic nerve neuritis associated with acute myelitis. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p 232.

787. SMITH, PRIESTLEY. Hemorrhage into sheaths of optic nerve. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 271.

DENTI (779) reports 11 cases of atrophy of the optic nerve which he treated with his electric douche. In some of them there was marked improvement, as he saw an increased injection of the papilla after the douches. There is no report of the visual field in any case. DANTONE.

EDMUNDS' (780) case was that of a patient who was attacked with optic neuritis under severe cerebral symptoms, epileptiform attacks, etc. The ophthalmoscopic picture of the fundus resembled that of retinitis albuminurica, although the urine was free from albumen. The cause was a tumor of the brain.

FITZGERALD.

FERRET (781) reports a case in which aphasia lasting three days, and permanent blindness of the left eye resulted from an injury in the left temporal region. The ophthalmoscope showed complete atrophy of the papilla. MARCKWORT.

FERRET (782) calls attention to the injurious influence of air filled with tobacco-smoke. He reports two cases of progressive atrophy of the papilla which were cured when placed in proper hygienic conditions and under ordinary treatment.

MARCKWORT.

NETTLESHIP (784) desires to call attention to certain not very common cases in which acute inflammation seems to take place in some small part of the course of the optic nerve. The characteristics which mark these cases are as follows: failure of sight limited to one eye, frequent neuralgic pain about the temple and orbit, and pain on moving the eye; at first little, sometimes no ophthalmoscopic change, disc more or less atrophic in a few weeks, and occasionally there are slight retinal changes. Nettleship reports 28 cases. Eleven out of 16, in which the field was taken, showed a definite central defect. The cases differ clinically from embolism of the retinal artery and allied conditions,

and from progressive atrophy, in the *quick* though not *sudden* onset, the slightness of the early ophthalmoscopic changes and often in the characters of the field, and from uniocular neuritis due to disease of the corresponding anterior lobe of the brain by the absence of cerebral symptoms. As regards the cause, Nettleship says that perhaps a very limited periostitis in the optic canal may account for some of the cases, and in others a rheumatic origin must be assumed. There was a history of syphilis in five of the cases, in one of severe sciatica, of fever in three, and severe, protracted toothache in two. FITZGERALD.

SHARKEY and LAWFORD (786) report the case of a young woman, aged seventeen, who four days after her sight began to fail became quite blind from optic neuritis, without any cerebral symptoms. Thirty-three days after vision began to fail paralytic symptoms exhibited themselves and in about four weeks the patient died. Microscopical examination of the spinal cord showed marked inflammatory changes in the lower cervical region and lumbar enlargement. The cervical region above the seat of disease also exhibited an acute inflammatory process, which was in an earlier stage than the myelitis below. There was intense inflammation of the optic discs, nerves and chiasma, involving to a less extent the optic tracts and the meninges of the lower frontal lobes. The authors draw attention to the conclusion of Gowers and Dreschfeld on similar cases, viz.: that the optic neuritis and myelitis are associated phenomena due to a common cause, but that neither depends directly on the other. Clinically such cases are of considerable importance, as previous to attention having been called to them the association of acute optic neuritis with paralytic phenomena would have justified the diagnosis of cerebral disease. Acute optic neuritis must consequently lose some of its significance as a sign of intracranial affection. FITZGERALD.

PRIESTLEY SMITH (787) relates the clinical history of a man who had an eclamptic attack the day after a fall. He was well until the tenth day after the accident, when he began to complain of headache. Two days later he was received into the hospital, where he died on the following day. The autopsy revealed a large subdural hematoma, and a marked destruction of the cortical substance of the inferior frontal gyrus, where there was a blood clot. The optic nerves were swollen behind the globes, due to hemorrhage into the subdural sheath, while the subarach-

noid spaces of the sheaths contained a colorless liquid, probably the cerebro-spinal fluid. FITZGERALD.

XX.—INJURIES AND FOREIGN BODIES (PARASITES).

788. BÈGUE. Corps étranger de l'iris, parcelle d'acier, extraction avec une pince aimantée. *Bull. de la clin. nat. ophth.*, 1885, vol. iii., p. 193.

789. DUCI. Cisticerco sotto-congiuntivale. *Gazz. d'ospit.*, vol. vi., 43.

790. DUFOUR. De l'aimant en thérapeutique oculaire. *Rev. méd. de la Suisse rom.*, 1885, p. 393.

791. FERGUSON. Foreign body in eye for over ten months. *Ophth. Rev.*, Oct., 1885, p. 293.

792. GALEZOWSKI. De l'extraction des corps étrangers métalliques de l'œil à l'aide d'un aimant. *Rec. d'ophth.*, Oct., Nov., 1885. Continuation and conclusion.

793. GRAEFE, A. Further communications on the extraction of cysticerci. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 33.

794. HALTENHOFF. Une extraction de cysticerque du corps vitré. *Ann. d'ocul.*, vol. xciv., p. 236.

795. HIRSCHBERG, J. The electromagnet in ophthalmology. Monograph. 17 illustrations. Leipzig, Veit and Co., 1885, 157 pages.

796. JANY, L. Another case of magnet-operation on the eye, with preservation of full vision. *Deutsche med. Wochenschr.*, 1885, No. 47.

797. KOLLOCK, W. Successful removal of a foreign body from the vitreous. Charleston, 1885.

798. PIERD'HOUY. Caso di insuccesso nell' uso dell' elettrocalamita. *Gazz. d'ospit.*, vol. vi., 54.

799. POOLEY, T. R. Extraction of a foreign body from the vitreous with an electromagnet. *Amer. Jour. Ophth.*, Aug., 1885.

800. SAMELSOHN, J. The behavior of the eyelashes in the anterior chamber. *C. f. A.*, vol. ix., p. 363.

801. SNELL, S. The use of the electromagnet. *Brit. Med. Jour.*, May 7, 1885.

DUCI (789) describes a cysticercus extracted by Pierd'houy, which was found beneath the ocular conjunctiva of the left eye of

a boy eight years old. The vesicle had grown in two months to the size of a hazel-nut, and did not cause any disturbance except slight limitation of mobility. DANTONE.

FERGUSON'S (791) patient, a boy about twelve years of age, was injured with bits of glass by the bursting of a retort. The greatly swollen lens was removed by a linear section, and the boy was discharged with good vision and a quiet eye. No piece of glass was found. Ten months later the boy returned with the eye much inflamed, and a piece of glass was found lying in the lower portion of the anterior chamber. It was removed with satisfactory results. Ferguson thinks the glass must have been embedded in some remains of the cortex, and when this was absorbed it fell into the anterior chamber. FITZGERALD.

GALEZOWSKI (792) reports several cases of extraction of chips of iron from various parts of the eye: (1) Removal of a chip of iron 1½ *mm.* long, which did not project over the surface, from the sclera with the electromagnet: complete recovery. (2) Extraction of a chip of iron from the vitreous on the ninth day after the injury; four months later fingers could be counted. (3 and 4) Two cases in which attempts at extraction failed: enucleation. (5) Completion of the clinical history of a case shown in 1881 before the Soc. de chir.: on March 23, 1881, Galezowski extracted a chip of iron from the retina with a magnetic probe, after he had made a longitudinal section four to five *mm.* long through the sclera between the external and superior muscles; eighteen days later Galezowski presented the patient at the meeting of the Soc. de chir., at which time he could read No. 12 of Galezowski's tests. A cataract due to the injury subsequently developed and was removed on Nov. 29, 1881. Three months later vision was normal with the proper glass. There is a defect of the visual field corresponding to the operative wound. MARCKWORT.

GRAEFE (793) presents a statistical review of the results of the forty-five operations for the removal of cysticerci which he has performed, 30, *i. e.* 67 %, of which were successful, and 24 of which were kept under observation. The cases of failure were mostly those of entozoa floating freely in the vitreous, while their spontaneous escape immediately after the section, without loss of vitreous, must be considered the rule when the parasite is situated beneath the retina. In four of the cases of failure enucleation or exenteration had to be performed, in one case phthisis bulbi subsequenty ensued, and in eleven cases the eye remained

in good condition; in eight of the latter vision also remained good. He once more describes at length the method of operating.

HALTENHOFF (794) describes a case of successful extraction of a cysticercus floating in the vitreous. The operation was performed without chloroform. The cysticercus escaped immediately after the incision, probably owing to its exact localization.

MARCKWORT.

HIRSCHBERG (795), to whom undoubtedly must be given the credit of having introduced into German ophthalmology the use of the electromagnet for the removal of chips of iron from the interior of the eye, presents in this monograph a clear, concise review of the 34 magnet operations which he has performed in the course of about five years. The particles of iron were lodged in various parts of the eye: 6 in the cornea, 2 in the anterior chamber, 1 in the iris, 2 in the lens, 21 in the vitreous, and 2 in the retina, for varying periods of time. In only 5 of these, or about 15 %, the magnet failed to bring out the foreign body, while in 3 of the cases enucleation would formerly have been necessary, though with the aid of the magnet good sight was preserved. In regard to the termination, only the more severe cases, in which the foreign body lay in the fundus of the eye, are considered. The majority of the patients did not come until vision had been completely and permanently destroyed. The fact that nevertheless the shape of the eyeball was preserved in some of these cases, thus avoiding enucleation, is sufficient proof to show what results may be expected from the magnet in the future, when the workmen themselves, the superintendents of the factories, and the physicians shall insist upon an early removal of the foreign body. Bibliography of 171 cases (including Hirschberg's). (We refer to Hirschberg's elaborate paper on the same subject in these ARCH., vol. x., p. 369.)

In discussing a case of successful extraction of a chip of steel from the vitreous, JANY (796) expresses the belief that in a large number of cases Hirschberg's magnet is not strong enough. He therefore constructed an electromagnet one and a half times as large, armed with a Voltolini immersion battery, with the aid of which he could extract foreign bodies more rapidly and surely in his experiments on the eyes of animals.

HOLLOCK (797) successfully extracted a chip of steel from the vitreous, and nine months later found that S = $\frac{20}{20}$. The vitreous was clear and fundus normal in every particular. BURNETT.

PIERD'HOUY (798) removed a chip of steel from the vitreous with a Froehlich magnet, but the attempt to seize it at the scleral wound with iris forceps failed ; the foreign body was stripped off at the inner edge of the wound and could not be found again.

DANTONE.

POOLEY'S (799) case was similar, but at the third introduction of the magnet the foreign body was brought to the edge of the wound and taken out with forceps. It was 4.5 *mm.* long and 1.5 *mm.* wide. V remained good. BURNETT.

In two cases of injury SAMELSOHN (800) saw an eyelash get into the anterior chamber, where it was caught between the edges of the corneal wound. In one of the cases the eyelash had disappeared after absorption of the surrounding masses of cortex, the remnants of the cells of the sheath of the root alone remaining within the corneal wound, while in the other the lash afterwards appeared in the scar and was extracted ; microscopical examination showed that the portion of the shaft within the anterior chamber had been loosened. Probably the eyelash had disappeared in the first case by similar maceration.

In some cases in which the position of the foreign body could not be ascertained, SNELL (801) magnetized it, and when a delicately balanced magnetic needle was held near the eye, it dipped in the direction of the foreign body. MAXWELL.

XXI.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

802. BAYER. On the changes in the fundus in sepsis. *Ber. d. ophth. Section d. Naturforscher-Versamml. zu Strassburg*, 1885, p. 171. These ARCH. vol. xv., p. 95.

803. CAPDEVILLE. Relations pathologiques entre l'œil et l'oreille. *Soc. méd. de Marseille*, Jan. 10, 1885.

804. COLEMAN, W. F. The use of the ophthalmoscope in brain diseases. *Jour. of the Amer. Med. Assoc.*, Oct. 31, 1885.

805. DEUTSCHMANN, R., and BRÜCKNER, A. On purulent meningitis after enucleation of the globe. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 251.

806. FIEUZAL. Lagophthalmus paralytique chez les diabétiques. *Bull. de la clin. nat. ophth.*, 1885, vol. iii., p. 192.

807. HOTZ, F. C. A case of choroiditis following typhoid fever. *Amer. Jour. Ophth.*, Oct., 1885.

808. JACOBSON, J. Relations between the changes and diseases of the organ of sight and the diseases of the constitution and other organs. Leipzig, W. Engelmann, 1885, 138 p.

809. KNAPP, H. Case of acute myelitis with ophthalmoplegia of both eyes and choked disc. *Ber. d. ophth. Section d. Naturforscher-Versamml. zu Strassburg*, 1885, p. 489. These ARCH., vol. xv., p. 93.

810. LEBER, TH. The occurrence of iritis and iridochoroiditis in diabetes mellitus and nephritis. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 203.

811. MACKENZIE, H. A case of double papillo-retinitis due to chlorosis. Successful treatment with iron. *Brit. Med. Jour.*, Feb. 14, 1885.

812. MAIOLI. Amaurosi bilaterale da distruzione parziale dei tubercoli quadrigemelli e totale dei talami ottici prodotta da acesso idiopatico (?) sviluppatosi nel ventriculo medio del cervello. *Boll. d'ocul*, Dec. 4, 1885, vol. viii.

813. NIEDEN, A. On affections of the sympathetic nerve. *C. f. A.*, p. 321.

814. NORRIS, W. F. On the relation between the earlier stages of gray degeneration of the optic nerves and the increase or diminution of the patellar or tendon reflex. *Trans. Amer. Ophth. Soc.*, 1885.

815. PARISOTTI E MELOTTI. Contributo allo studio della amaurosi saturnina. *Gazz. d'opit.*, vol. vi., pp. 86–88.

816. PFLÜGER. Gun-shot wound of both occipital lobes. Blindness from optic neuritis. *Ber. d. ophth. Section d. Naturforscher-Versamml. zu Strassburg*, 1885, p. 503, cfr. These ARCH., vol. xv., p. 94.

817. PICHOU. De l'épilepsie dans ses rapports avec les fonctions visuelles. *Thèse de Paris*, 1885.

818. RAGGI. Inversione del movimento pupillare in un individuo affetto di paralisi progressiva degli alienati. *Ann. Univ. di Med. e. Chirurg.*, vol. cclxxiii., July, 1885.

819. TAY, WARREN. Immediate blindness of left eye after injury of the head. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 266.

820. WATSON. Temporary blindness with papillitis. *Trans. Ophth. Soc. Unit. Kingd.*, 1884, p. 269.

821. WIESINGER, F. On the occurrence of inflammation of

the iris and cornea in diabetes mellitus. *v. Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 203.

Basing his remarks on a lecture by A. Brückner, DEUTSCHMANN (805) presents a review of the twenty-six cases thus far observed of purulent meningitis after enucleation, in ten of which the autopsy confirmed the clinical diagnosis ; in the remaining twelve ending in death, and four ending in recovery, there was also meningitis beyond a doubt. In one case a gliosarcoma was found at the base. It is therefore certain that acute purulent meningitis may follow the removal of an eye. The primary cause lies in an infection of the orbital wound whence the infection spreads through different pre-determined paths (once on the sheath of the abducent nerve) to the cranial cavity, where it causes a generally fatal inflammation. Deutschmann thinks that exenteration offers greater protection against infection, and therefore prefers it to enucleation.

HOTZ (807) observed in a man aged twenty-six when convalescent from typhoid fever a localized peripheric whitish exudation and floating opacities of the vitreous. Under hypodermic injections of pilocarpine vision improved, but the atrophic patches in the choroid remained. BURNETT.

JACOBSON'S (808) monograph discusses at length the connection between ocular affections and constitutional diseases, and may be considered a valuable supplement to Förster's publication.

LEBER (810) has seen nine cases of iritis among thirty-six of diabetes mellitus, twice complicated with hypopyon, while four times in six eyes a fibrinous exudation was observed which filled the whole anterior chamber, similar to that of rheumatic iritis. The disappearance of the exudation was favorably influenced by salicylate of sodium, which remedy possesses a similar curative power in retrobulbar neuritis. Spontaneous relapses were not observed, while they occurred frequently after operations on these eyes. In two cases he found atrophic excavation of the papilla after successful extraction of cataract ; opacities of the vitreous occurred frequently, together with iritis, indicating that the latter was really an iridocyclitis. In one case glaucomatous increase of pressure was found in a diabetic person with nephritis and history of syphilis ; both eyes were lost through hemorrhagic glaucoma. He also adds the history of a case of marked albuminuria complicated with decided iridochoroiditis and contraction of the retinal blood-vessels ; attention is called to the similarity of the

secondary affections of the eye in these two constitutional diseases.

NIEDEN (813) reports the further course of the disease in a case, reviewed in a previous number, viz., a case of affection of the sympathetic nerve in the territory of the eye, in which there were marked symptoms of paresis of the oculo-pupillary branches. The sympathetic plexus of the heart afterwards became affected, as was shown by the absence of two or more pulse beats in succession. The general health of the patient was not materially affected. The curve of the pulse is added.

The important paper of NORRIS (814) with its tables and diagrams of visual fields is based on a study of 47 cases. It is shown that there is always an appreciable contraction of the visual field for form and color, even when central vision is yet normal and the pupillary reaction prompt. In the whole number tested the knee-jerk was normal in 6 cases, increased in 18, diminished in 10 and abolished in 3. Males predominated; none were under 10 years, 6 between 20 and 30, 13 between 30 and 40, 17 between 40 and 50, 9 between 50 and 60, and 2 between 60 and 70. The author thinks that, in the earlier stages, the disc is of a dull red-gray tint which can be diagnosed by a weak illumination and the upright image. BURNETT.

PARISOTTI and MELOTTI (815) report a case of simple pallor of the disc without neuritis or affection of the kidneys in a workman suffering from chronic lead-poisoning. He gave up his occupation with lead colors and abstained from alcohol, whereupon marked improvement took place.

RAGGI (818) observed contraction of the pupils when the lids were closed in an insane person, aged 43, who was suffering from progressive paralysis. When the lids were opened there was marked dilatation of the pupils, which after a few spasmodic contractions returned to their normal width. The right pupil was always a little wider than the left. DANTONE.

TAY (819) reports the case of a man who was unconscious for three quarters of an hour after a severe fall on the head. Blood oozed from the left nostril and the right ear. No perception of light. Subsequently atrophy set in in the left disc. Hearing of right ear almost, if not completely lost. In this case there was probably a diagonal fracture involving one orbit and the opposite petrous bone. FITZGERALD.

WATSON (820) observed choked disc in a similar case of injury,

where, on account of the violence of the patient, no ophthalmoscopic examination was made until ten days later. There was complete loss of smell. About a month later the patient had quite recovered his sight, but not the sense of smell. FITZGERALD.

WIESINGER (821) reports in detail the clinical history of nine cases of iritis in diabetes observed at the Göttingen clinic, while keratitis has thus far not been found; he briefly mentions, however, nine such cases which have thus far been published.

REVIEW.

The Refraction and Accommodation of the Eye and their Anomalies. By E. LANDOLT, M.D., Paris. Translated by C. M. Culver, M.D., of Albany, N. Y. Philadelphia : J. B. Lippincott & Co., 1886. Pp., xv. + 600. Price, $7.50. (Reviewed by Swan M. Burnett.)

Since the publication of Donders' classical treatise by the New Sydenham Society, in 1864, this is the most exhaustive work on the subject of refraction and accommodation that has appeared in the English language, and it is of interest to observe that both are translations. The questions naturally arise : Do the English-speaking people take less interest in that branch of ophthalmic practice, or has the man not yet arisen who considers himself competent or willing for the task of writing such a work for his countrymen ?

Dr. Landolt, as we all know, is an industrious worker, and nowhere have the results of his close and painstaking study been recorded to better advantage than in the beautifully printed volume before us. It cannot supply the place of Donders, for that great work must always be, in a measure, the refractionist's bible, nor can it compare, in the elaborate working out of certain details, with the comprehensive treatise of Mauthner ; but there is no work which the beginner in the study of refraction can read to greater profit than this one of Dr. Landolt's. The author has a happy faculty of simplifying things, and it finds nowhere a more appropriate field for its employment than in the domain of refraction.

As a part of his effort to make his work easy reading for the purely practical man, he has divided his book into three separate parts, which are in a certain measure independent of each other, and one can be read understandingly without a thorough knowledge of the other.

The first part treats of optics pure and simple—the physical portion, the second is the theoretical portion, and the third the clinical portion ; and not the least worthy feature of the work is a good index.

Of the first part, we have only to say that it is up to the average of such preliminary treatises on physiological topics ; in certain

respects even superior. For the beginner, however, with but a limited knowledge of mathematics, Loring's optical appendix to his text-book on the ophthalmoscope is better, while for the more advanced student the little work by Gavarret ("Images par Réflexion et Réfraction"), which is scarcely larger than Dr. Landolt's physical portion, has not its equal in any language for simplicity and thoroughness.

The theoretical and clinical parts of refraction are so intimately connected, that we question the wisdom of giving them separate considerations, and the author's doing so has led to what is, perhaps, the most serious fault of his work, namely, the omission, entirely, of any clinical study of astigmatism. While the ulterior results of astigmatism are perhaps not so striking as those of myopia, for example, there yet remains much to be looked after when the diagnosis has been completed.

The theoretical portion is, on the whole, admirably well done. Each reader will find, it may be, some parts more restricted than he would desire, and, on the other hand, an undue prominence given to subjects which could properly be considered elsewhere, but, after all, we think it would be difficult for any one man to do it better. As is well known, the author has latterly given much attention to the matter of Convergence and its anomalies, and a relatively large portion of this and the succeeding chapter is given to a study of the subject. Here will be found the most complete elaboration of the meter-angle, as introduced by Nagel, that exists in ophthalmological literature, and the author's method of dealing with insufficiency by operation.

In the portion devoted to dioptometry all the usual methods are set forth with sufficient detail and clearness, and a very good description of Smidt-Rimpler's method by the inverted ophthalmoscopic method is given. There is also considerable space devoted to an exposition of the shadow test, and we note with regret that he has added another to the already too numerous ill-chosen names for that process. He calls it *koroscopy* (which is certainly etymologically more correct than *pupilloscopy*), but why, we are at a loss to understand, for certainly Dr. Landolt knows as well as any one that the test object is not the pupil, but the aerial image of the flame formed by the refracting media of the eye, and the thing we observe is its shadowy edge. It may be noted, too, in connection with this part, that he rarely paralyzes the accommodation in determining refraction.

The clinical portion is by far the best in the book, and the display of sound judgment in the prescribing and selection of glasses is most commendable, and particularly apt at this time when a proper conservatism is needed to check the tendency to burden the whole human race with spectacles. He says: "We shall abstain, therefore, from giving spectacles except in cases of absolute necessity, or unless they render the patient so great service that the attendant inconveniences disappear in comparison with it" (p. 376).

Much space is given to the study of malignant myopia and the development of myopia in schools, of which an abstract can do but scant justice.

Dr. Culver has done his work as translator well; and we may note as a matter of present interest that he calls the meter-lens a *dioptry*.

MISCELLANEOUS.

GEO. H. POWERS, M.D., was appointed to the Professorship of Ophthalmology and Otology, in the Medical Department of the University of California, March 2, 1886.

He succeeds in the chair above mentioned, Prof. A. M. WILDER, M.D., a studious, progressive man, and one of original and originating mind, who died of pernicious anæmia Jan. 17, 1886.

Dr. A. SCHENKL, of Prague, has been appointed extraordinary Professor at the German University of that city.

Dr. GUISEPPE ALBERTOTTI has been appointed Professor of Ophthalmology in Modena, and Dr. A. ANGELUCCI extraordinary Professor at Cagliari.

On Nov. 27, 1885, Professor DEL MONTE died at Naples after a long illness. (*Klin. Monatsbl. f. Augenhk.*)

JULES GUÉRIN, born 1801, died Jan. 25, 1886.

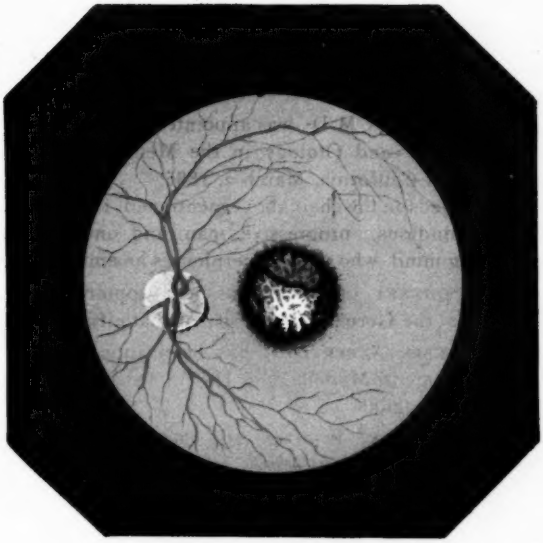
At the Congress of Russian Physicians which met at St. Petersburg, in Dec., 1885, a Russian Ophthalmological Society was formed, whose statutes shall be ready when the next Congress of Russian Physicians meets.

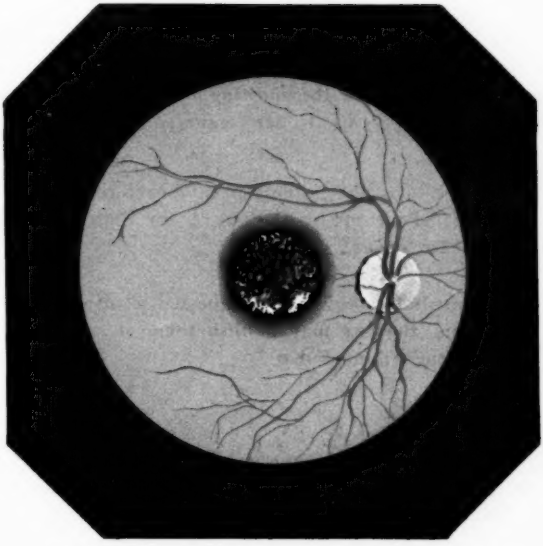
Prof. Dr. SCHWEIGGER, chairman, and Dr. C. HORSTMANN, secretary, request that papers be sent in to be read at the ophthalmological section of the meeting of naturalists, to be held at Berlin, from Sept. 18th. to Sept. 24th.

ERRATA:—Page 287, line 5 from above, read Plate A instead of Plate 4. Page 295, read Plate A for Plate B, and *vice versa*, wherever they occur.

Our contributors are kindly requested to inform us of errata in their papers, that we may publish them in a list with the last number of the volume.—ED.

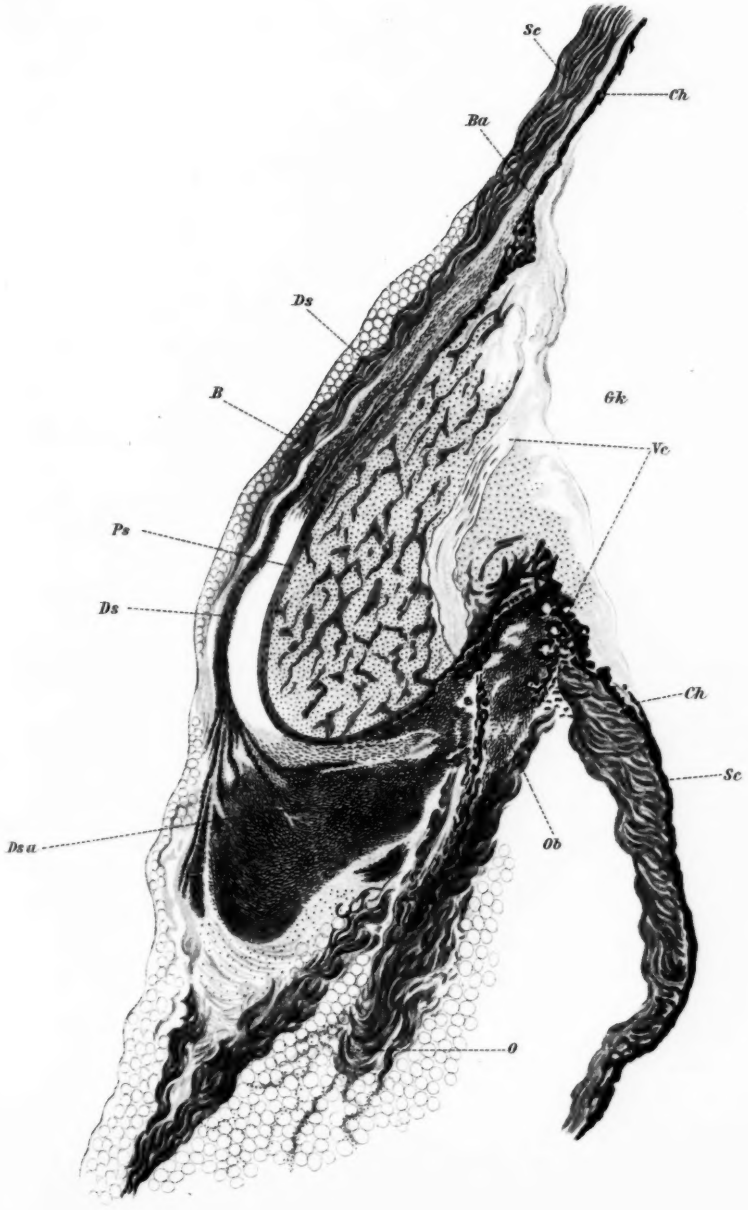
Right eye.





Left eye.

A.



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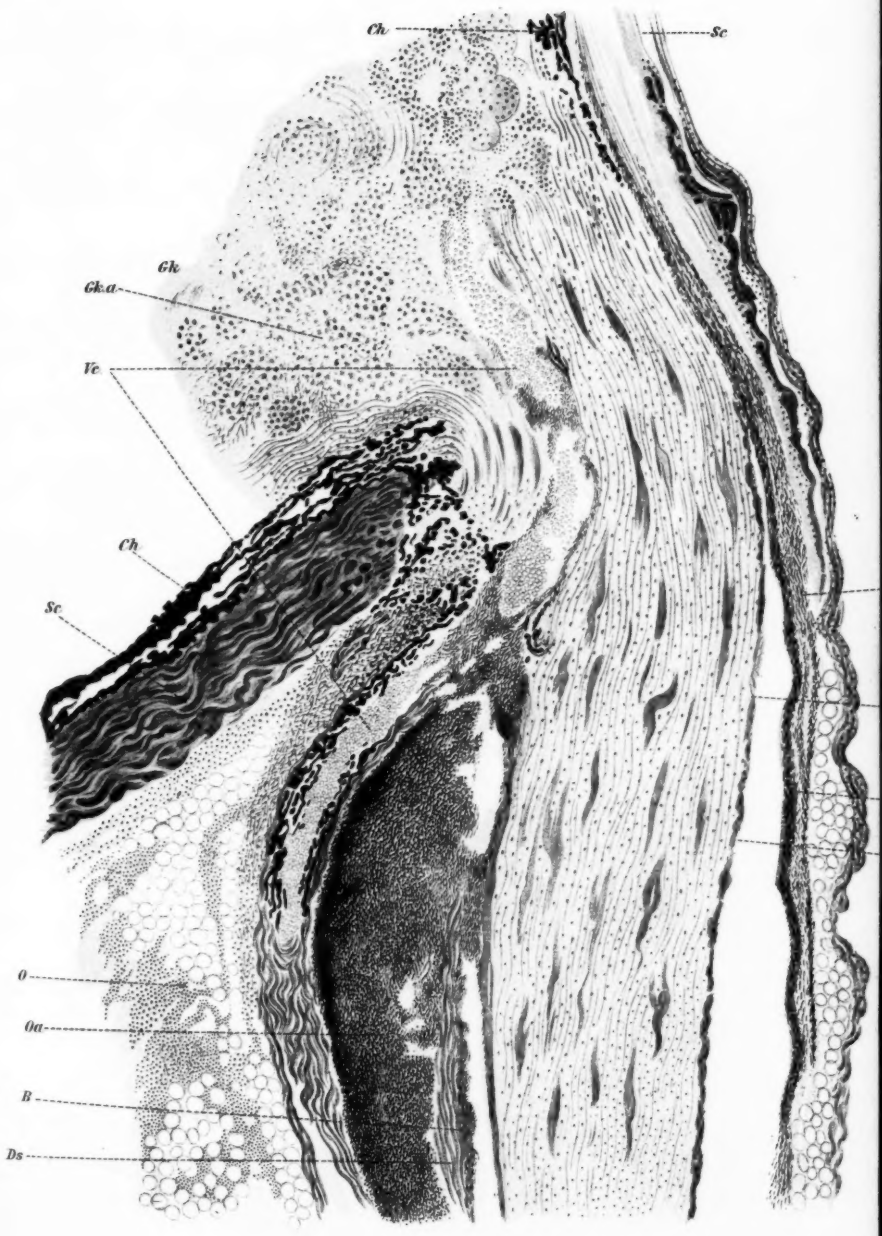

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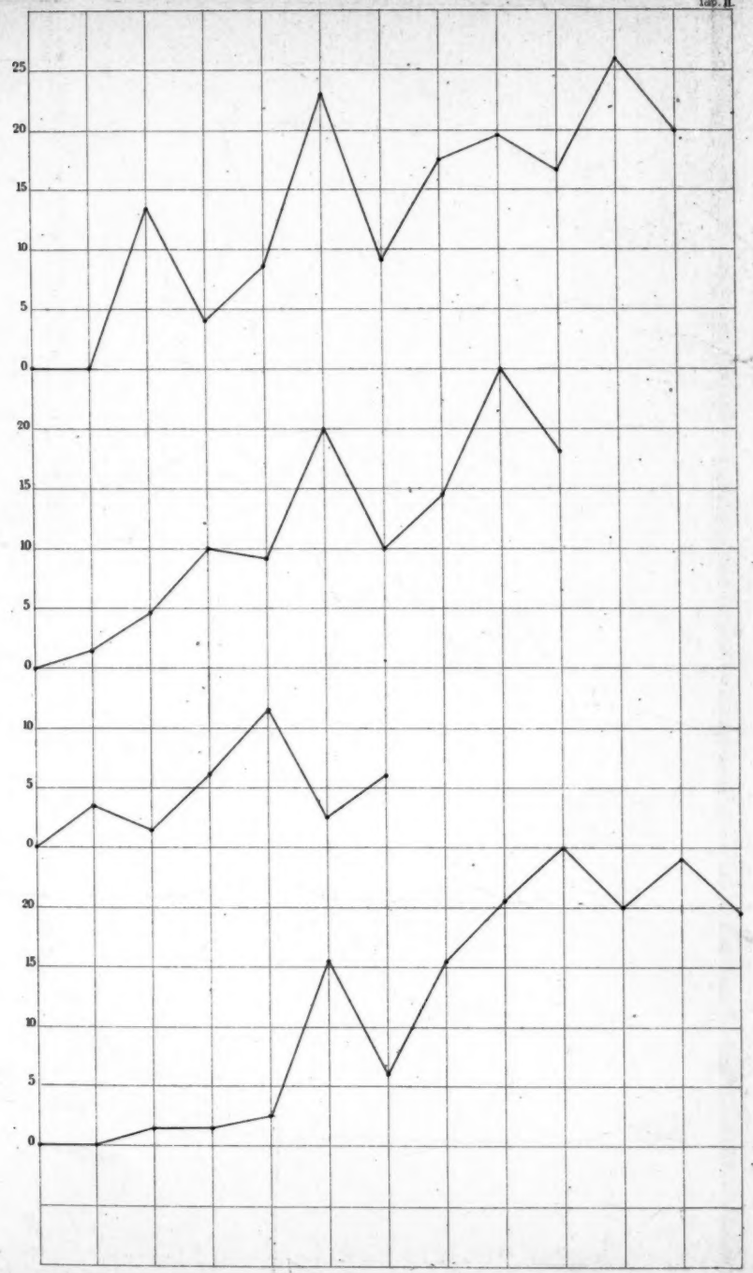
Tab. II.



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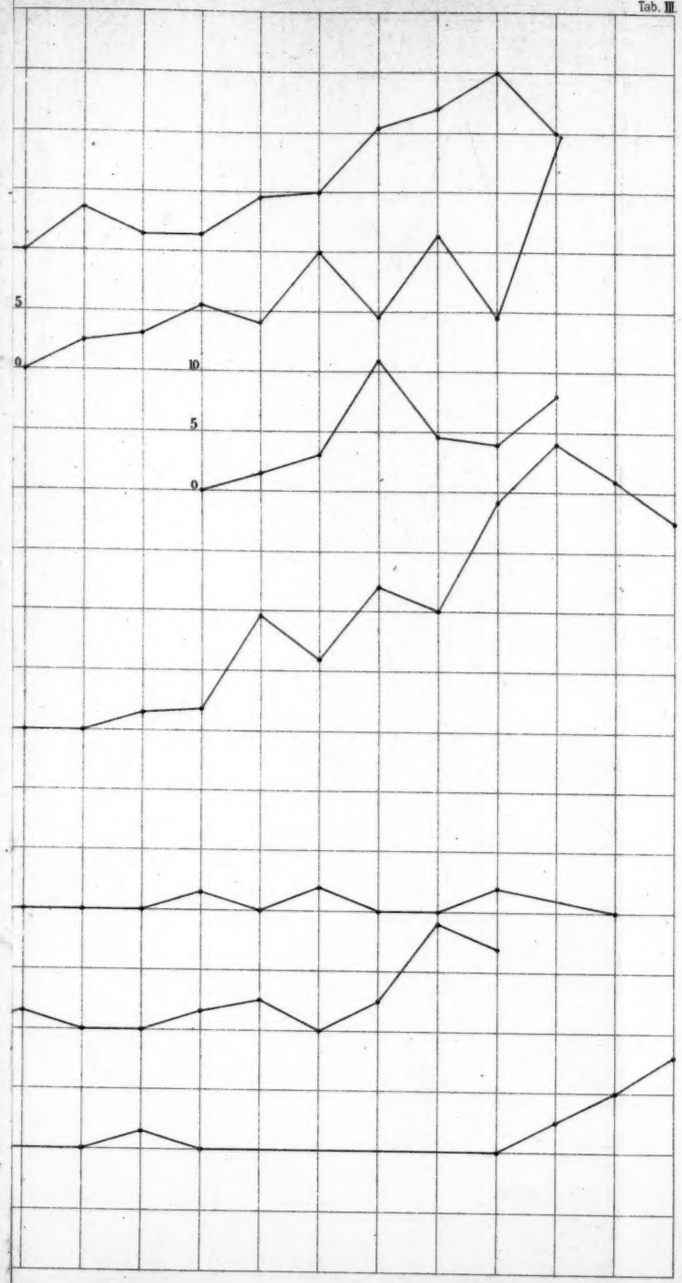
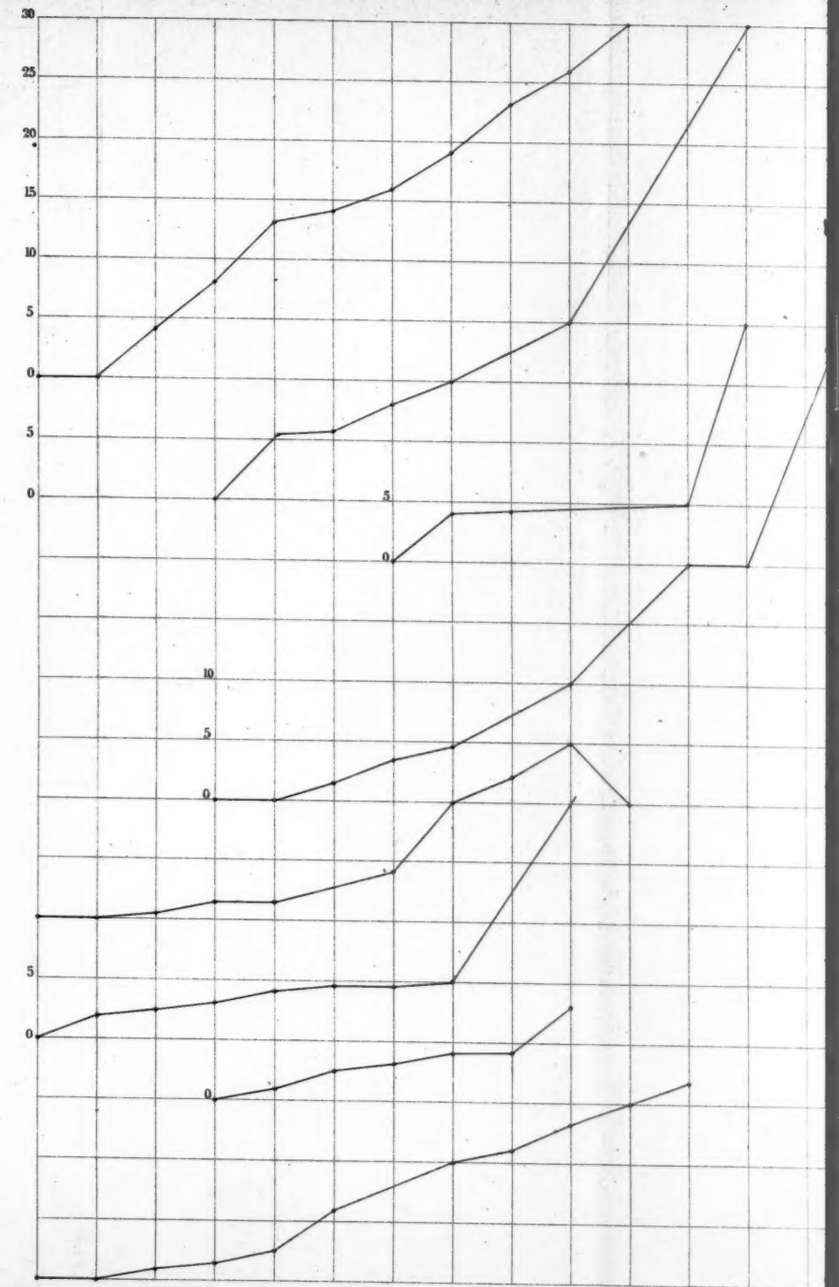
Tab. III.





Lith. Anst. v. F. Wirtz, Da